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AIR POLLUTION ABSTRACTS

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This periodical is published to inform air pollution personnel of the Environmental Protection Agency (EPA), and others, of technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given. Translations are cited with their sources whenever possible. The subject fields are as follow: Emission Sources; Control Methods; Measurement Methods; Air Quality Measurements; Atmospheric Interactions; Basic Science and Technology; Effects-Human Health; Effects-Plants and Livestock; Effects-Materials; Economic Aspects; Standards and Criteria; Legal and Administrative; Social Aspects; and General and Miscellaneous. All abstracts are listed under one of the above subject fields. A subject and author index are included. This issue contains abstracts 12682 - 13317.

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AIR POLLUTION ABSTRACTS

Vol. 2, No. 9 September 1971

Prepared by:
Air Pollution Technical Information Center (APTIC)
Research Triangle Park, North Carolina 27711

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Personal authors (maximum of five per document) are arranged alphabetically. The names are presented last name first. The title of the document is indented below the author's name; when the author is the first author of a title, an asterisk precedes the Abstract Number on the next line.

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INTRODUCTION

This periodical is published to inform air pollution personnel of the Environmental Protection Agency (EPA), and others, of technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given.

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The serial publications (journals, periodicals, etc.) which are regularly screened for input are listed with their publishers' addresses in one issue in each volume of our abstract bulletin; the most recent list appeared in the December 1970 issue.

As another service, abstracts of all of the literature in APTIC (not just in a single issue of this periodical) on any subject related to air pollution will be provided free of charge upon request. APTIC can search information more recent than that in the current issue of this periodical because of the lapse of time entailed by editorial, make-up, and printing work. More than 1400 subject index terms are available for such searching—more than those included in the subject index in each issue.

SUBJECT FIELDS AND SCOPE NOTES

1. EMISSION SOURCES

Information pertaining to an industry, process, or material associated with air pollution. Documents in this category are concerned primarily with characteristics of a specific class of emission sources including types, rates, industries; secondary coverage may include effects, control methods, etc.

2. CONTROL METHODS

Includes equipment and both specific source control and general abatement efforts. Included are documents describing the operating principles, design, operation, efficiency, etc., of equipment and methods of removing pollutants. The scope of the document can vary from a device for a specific source to an approach applicable to an entire industry—e.g., automobiles.

3. MEASUREMENT METHODS

Includes equipment as well as methods. Confined to development, testing and evaluation of pollutant determination methods (sampling, analytical, monitoring) and equipment, as such. Data obtained by use of methods in specific applications are placed in the applicable subject categories.

4. AIR QUALITY MEASUREMENTS

Pollution measurements in the ambient air, generally related to specific geographical locations, such as area surveys. Also includes general reviews of area situations and emission source inventories.

5. ATMOSPHERIC INTERACTION

All chemical and physical phenomena occurring in the atmosphere. Included is material on dispersion, air pollution forecasts, meteorological effects, topographical effects, photochemical reactions in the atmosphere, etc. Laboratory studies of photochemical reactions are assigned to Basic Science and Technology.

6. BASIC SCIENCE AND TECHNOLOGY

General discussions or data compilations for the basic physical and chemical properties of pollutants. Theoretical and laboratory studies on related chemical and biological reactions and mechanisms. Mass transfer and other basic knowledge related to process engineering applications in emission control or abatement. Excludes photochemical studies in the atmosphere and biochemical studies related to effects of air pollution.

7. **EFFECTS–HUMAN HEALTH**

   Covers medical and epedemiological studies; biological effects other than those on plants and livestock produced by air pollutants; laboratory animal experiments.

8. **EFFECTS–PLANTS AND LIVESTOCK**

   Effects on vegetation–crops, trees, other plants–and on livestock as distinguished from laboratory experimental animals.

9. **EFFECTS–MATERIALS**

   Deterioration, corrosion, etc., of physical materials, buildings, and structures.

10. **ECONOMIC ASPECTS**

    Economic implications of air pollution and its control, e.g., economic losses from pollution damage, and costs of control programs or equipment in general.

11. **STANDARDS AND CRITERIA**

    Recommended or adopted guides, criteria and standards for allowable emission limits or pollutant concentrations, air quality, equipment characteristics, and fuels.

12. **LEGAL AND ADMINISTRATIVE**

    Legal aspects include legislation, ordinances, rules, litigation, hearings, decisions, etc. Administration covers administrative and miscellaneous information concerning control agencies and control and research programs. Typical topics are personnel, budgets, contractural activities and program descriptions.

13. **SOCIAL ASPECTS**

    Sociological and psychological aspects such as social attitudes, public opinion studies, public relations, and public information.

14. **GENERAL AND MISCELLANEOUS**

    Reviews of general problems, trends and background. Documents not assignable to other categories.

ABSTRACT BULLETIN

EMISSION SOURCES

12682 APTIC NO. 30223

LOW-POLLUTION TWO-CYCLE ENGINE DEMONSTRATED BY CLEAN ENGINE RESEARCH INSTITUTE. *(Teikogai no 2 saikuru enjin - kurin enjin ken ga kokai jikken). Text in Japanese. PPM (Japan), 2(4):13, April 1971.*

A low-pollution, low-noise, two-cycle engine, developed from studies by the Japan Automobile Research Institute (Nippon Jidosha Kenkyusho) is described. The combustion chamber in the upper part of the engine cylinder has a wedge shape instead of the conventional hemispherical shape; the exhaust pipe is equipped with a valve interlocked with the accelerator. Both innovations eliminate imperfect combustion of fuel, the weak point of a two-cycle engine. The new 360 cc engine was mounted in a commercially available compact car for the demonstration; test results showed significant reduction of exhaust pollutants. Carbon monoxide accounted for 0.53% or only one-fifth compared with a conventional two-cycle engine; hydrocarbons, 2800 ppm or about one-half the density from a conventional engine; and nitrogen oxides, 100-500 ppm or about one-fifth found with the conventional engine. Compared with a four-cycle engine mounted in an ordinary car, these figures are one-tenth for nitrogen oxides, about one-half for hydrocarbons, and about equal for carbon monoxide, showing a remarkable overall improvement. The engine uses unleaded gasoline and its rpm in idling is reduced to about half that of a conventional engine, thus reducing the density of emission gas and its harmful constituents. The operating noise peculiar to a two-cycle engine does not occur with the new engine; it can operate as quietly as a four-cycle engine. The production cost is estimated to be about the same as for a conventional two-cycle engine.

12683 APTIC NO. 30383

ENVIRONMENTAL PROTECTION PROBLEMS OF THE WOOD PROCESSING INDUSTRY TO BE ANALYZED. *(Skegsindustrins miljovardsfragor utreds). Text in Swedish. Tek. Tidskr., 101(1):54-55, Jan. 14, 1971.*

During 1970, the wood products industries of Sweden will be collaborating in a project to study known techniques of pollution control and to develop new ones specifically for use by these industries. The project is sponsored jointly by the Society of Swedish Cellulose and Paper Industries and the Wood Industries Foundation for the Study of Water and Air Pollution Control. In earlier times, these industries used larger quantities of fresh water and dumped a much larger quantity of chemicals into Swedish streams. Pollutants, expressed in terms of biochemical oxygen demand, once reached figures as high 250-500 kg BOD5 per ton of pulp produced. The modern use of the recycling of water and chemicals has reduced the output from a sulfate process plant to 25-40 BOD5 per ton, the higher figure applying to processes involving bleaching. In the past 5 years, the wood industries have invested about 250 million kronor (about $50 million) in environmental protection. During the first half of 1970, the investment required in this area will reach the neighborhood of 700 million kronor (about $133 million). Meanwhile, the manufacturing processes themselves are in a state of flux, so that new wood industries can expect to invest as much as 10% of its installation costs in pollution control equipment, while in older plants such provisions are anticipated to be more costly and complicated. The new project will seek to develop manufacturing techniques with a lower pollution output, as well as to investigate more efficient ways of separating, and neutralizing the pollutants. It will encourage an exchange of information with the USA, Canada, Finland, and Norway. Eight study groups have been formed, each dealing with a different phase of the general problem.

12684 APTIC NO. 30460

POWER UNITS. *In: Twenty-fourth Annual Report, 1st July 1968 -- 30th June 1969. Motor Industry Research Association, Nuneaton (England), p. 12-13, 1969.*

Current research work of the Motor Industry Research Association on the problem of air pollution by diesel and gasoline engines is outlined. One project involves devising a specification for an opacimeter, that is, a smokemeter that uses an optical principle to measure diesel smoke concentration. In a study oof motor vehicle exhausts, it was found that exhaust gas recirculation reduced nitrogen oxides by about 50% during high engine loads without impairment of fuel economy. When comparison was made between the variable-dilution method of exhaust analysis and the continuous-analysis method, the former tended to indicate higher emissions. Other studies showed that hydrocarbon emission figures for gasoline engines are lowest at an air-fuel ratio of about 16.5:1 and that appropriate nozzle rings increase turbocharged engine output by 20%. The association has also issued a preliminary report on day-to-day correction factors for turbocharged engines.

12685 APTIC NO. 30576

SMOG, THE POISONER OF CITIES. *(Lo smog avvelena le citta). Text in Italian. Lo Smog (Italy), p. 35-38, 1970.*

In Italy, there are three cities that may be said to have an important smog problem: Turin, Genoa, and Rome, and only Milan has thus far made an attempt to study this atmospheric cancer. Italian medical records for the year 1943-1970 record 32,393 cases of simple silicosis, and additional 3338 cases of silicosis with (tuberculosis) lung complications (3212 of which were fatal) and 744 cases of asbestosis. The city of Milan annually consumes a million tons of fuel and burns about 10,000 tons of refuse. It is estimated that with atmospheric interaction this produces about 60,000 tons of sulfur dioxide and 100,000 tons of sulfuric acid for use by the respiratory tracts of the people of Milan. According to another estimate, 60% of the total annual deterioration of metals is due to the corrosive action of SO2. A study conducted in Milan, beginning in 1953, demonstrates that in one month s time, each square kilometer of the city s surface receives an average deposit of 4.5 tons of dust (a maximum of 15 tons in the more industrialized sections). An annual decrease in this dust fall of 0.845 tons per square kilometer would seem at first glance to indicate progress in air pollution control. Unfortunately, it merely indicates a change in the type of fuel used -- from solid fuels, which produce more dust, to other fuels that produce larger quantities of SO2.

12686 APTIC NO. 30647

Ministry of International Trade and Industry, Tokyo (Japan)

INSPECTION RESULTS OF CADMIUM MINES AND REFINERIES. 1970. *(Kadomyumu kanren kozan seirensho no 45 nendo kensa kekka nitsuite). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 7(5):250-257, May 1971.*

Mines and smelters which handle zinc, copper, or lead were inspected. It is important to control the overall effluent so that its cadmium concentration is within the allowable limit of (0.1 ppm). Of 62 mines inspected, two exceeded the limit with 0.542 ppm and 0.145 ppm respectively. To indicate the individual effluent condition, the maximum and minimum concentrations are shown in tabular form. Three other mines also exceeded the 0.1 ppm limit with 0.125 ppm, 0.14 ppm, and 0.195 ppm, respectively. However, the overall effluent showed less than the standard concentration. Strong supervision is recommended to reduce the seepage from old piles and to reduce the individual effluent at each pit and pile. Two smelters exceeded the standard, with 0.175 ppm and 0.111 ppm, respectively. The water near several mines and smelters was sampled, and four mines exceeded 0.01 ppm. The atmospheric cadmium concentration was also measured. Even under the most unfavorable condition, all were within the standard of 0.88 micrograms /cu m -2.93 micrograms /cu m. The mines and smelters which exceeded the standard were directed to close the pit, repair defective water discharge facilities and neutralize the seepage. A thorough study will be made to clarify environmental pollution by cadmium, distinguishing it from complex pollution.

12687 APTIC NO. 30666

Ministry of International Trade and Industry, Tokyo (Japan)

ON THE RESULTS OF CHECKS MADE ON MINES AND SMELTERS CONCERNED WITH CADMIUM, 1970. *(Cadmium kanren kozan seirensho no 45 nendo kensa kekka ni tsuite). Text in Japanese. 17p., April 1971.*

In accordance with the Mine Safety Law, the Ministry of International Trade and Industry in Japan conducts an inspection on the heavy metals discharged by mines and smelters. Inspections were conducted on 62 mines and 31 smelters related with cadmium discharge in 1970. Inspections were made on old piles, old discharging outlets, pits in operation, and pits which are not in operation. The JIS M0202 inspection method was adopted for checking water quality. The overall discharged water must be in conformity with the water quality standard of less than 0.01 ppm. Of 62 mines, 2 mines exceeded 0.1 ppm; one, 0.542 ppm and the other, 0.145 ppm. Five mines exceeded 0.1 ppm at their maximum. The Mine Safety Law is applicable to 25 of 31 smelters, and whose overall discharged water was within the 0.1 ppm range. Of the six smelters to which the law is not applicable, one exceeded the standard (0.111 ppm). In the surrounding area of four mines, the cadmium concentration exceeded 0.01 ppm; however, discharged water from three mines had a lower than standard concentration. The 25 smelters, which come under the Mine Safety Law, were in keeping with standards as to the environmental water cadmium concentration. One out of six smelters which do not come under the law, one exceeded the standard, with 0.029 ppm in the environmental water. The cadmium concentration in atmosphere was measured at 162 areas surrounding 31 smelters. The concentration in the atmosphere was below the standard of 0.88 ug/cu m 2.93 ug/cu m.

12688 APTIC NO. 30428

Ault, Wayne U., Ronald G. Senechal, and Woodland E. Erlebach

ISOTOPIC COMPOSITION AS A NATURAL TRACER OF LEAD IN THE ENVIRONMENT. *Environ. Sci. Technol., 4(4):305-317, April 1970. 8 refs. (Presented at the American Chemical Society Meeting, Symposium on Air Conservation and Lead, 157th, Minneapolis, Minn., April 14-15, 1969; includes discussions by Paul W. Gast and Richard B. Holtzman.)*

The isotopic ratio of lead-206 to lead-204 was investigated as a means of defining the lead in various environmental media; this isotopic ratio, together with appropriate abundance data, would allow distinguishing between lead from different sources. Significant differences were found in the lead isotopic ratios in rock and soils, grasses, tree leaves and tree rings, air particulates, and in some industrial products such as coal, fly ash, gasoline, and fuel oil. Leaf, grass, and soil samples taken across the New Jersey Turnpike showed a change in lead isotopic ratios from the Turnpike to a point one mile to windward. The mean value of the Pb-206/Pb-204 ratio in topsoil within 500 feet of the Turnpike was 18.2 plus or minus 0.2 and beyond 500 feet was 18.7 plus or minus 0.15. Lead sampled from soil profiles in two forested locations in northern New Jersey showed an increase in Pb-206/Pb-204 ratios, with depth from 18.7 to 19.9 in a 30-inch profile. The lead abundance decreased from 47.5 to 12.0 ppm. The mean ratios of Pb-206/Pb-204 from coal and gasoline analyzed were 18.8 plus or minus 0.2 and 18.3 plus or minus 0.3, respectively. The mean value for the same ratio in the published data on coal is somewhat higher. Fly ash and the coal from which it came both contained lead of the same isotopic ratio. (Author abstract modified)

12689 APTIC NO. 30882

Ayres, Robert U.

AIR POLLUTION IN CITIES. *Natur. Resources J., 9(1):1-22, Jan. 1969. 23 refs.*

The single most important source of air pollution is energy conversion, especially where the combustion of fossil fuels is concerned. It is convenient to consider the problem in four segments: utility power generation, transportation, industry, and households and commerce in general. Carbon dioxide, oxides of nitrogen, carbon monoxide, sulfur oxides, and other emissions from combustion sources are discussed. Fatalities are not as a rule traceable individually to the impact of air pollution, primarily because most of the effects are synergistic. Thus, air pollution is an environmental stress which, in cooperation with a number of other environmental stresses, tends to increase the incidence and seriousness of a variety of pulmonary diseases, including lung cancer, emphysema, tuberculosis, pneumonia, bronchitis, asthma, and even the common cold. Effects to animals, plants, and property are also considered, as well as costs and pollution control policies and technologies.

12690 *APTIC NO. 30144*

Boehmlaender, Fritz

WASTE GASES FROM REFUSE COMBUSTION. (Abgase der Muellverbrennung). Text in German. Staub, Reinhaltung Luft, 31(5):208-210, May 1971. 13 refs.

Modern incinerators have been operating in Switzerland and Germany for the past few years. Their capacities range from 200 to 400 tons per day. Such large plants utilize the heat for cooling the combustion gases. For waste gas cleaning an electrostatic precipitator or a combination of a cyclone and an electrostatic precipitator is used. The waste gases are led through an 80 m high stack into the atmosphere. Incineration takes place on different grate systems, usually in three successive stages which serve for drying, combustion, and afterburning. Studies revealed that undergrate firing is instrumental in the off-transport of solid matter by the combustion gases. Chlorine, contained in the refuse, leaves the incinerator in the gaseous form. The waste gases of incinerators also contain carbon dioxide, carbon monoxide, sulfur dioxide, nitrous anhydride, hydrochloric acid, and sulfuric acid. These gases are present in quantities that can be easily analyzed. In the Nueremberg incinerator, the waste gas contained 300 to 600 mg HCl/cu m, 740 to 1060 mg SO2/cu m, and 150 to 250 mg N2O3/cu m. In the waste gas of a hospital incinerator, 92 to 111 mg HCl/cu m was measured. The slag was free of chlorine. Wet collectors are best suited for the removal of HCl. An HCl concentration of 17.7 g/cu m could be reduced to 0.0004 g/cu m waste gas.

12691 APTIC NO. 30174

Boyer, J. and M. Bousquet

THE POINT CONCERNING NUISANCES I. AIR POLLUTION. *(Le point sur les nuisances I. La pollution de l air). Text in French. Concours Med. (Paris), 93(11):1885, 1886, 1889, 1892, March 1971.*

The main causes of air pollution are reviewed as well as remedies that have been developed to-date. Fumes can be abundant in the atmosphere around towns, produced by domestic and industrial combustion and by automobile traffic. Dust in the air settles eventually, unless it combines with fog into smog. Ultrafine particles of sizes between 0.2 and 0.0002 micron are hard to detect, but are dangerous to man because they penetrate deeply into the human lung. The carcinogen carbides originating from domestic and industrial soot and from automobile exhaust gases are particularly dangerous. Dust samples collected from simple dust deposits show the presence of benzo-3-4-pyrene, a substance now used for inducing experimental lung cancer in animals. Carbonic gas as such, generated by burning, is not dangerous. Carbon monoxide, however, is dangerous, particularly as it accumulates at intersections, emitted with the automobile exhaust gases. Still more important is the pollution by sulfurous gas, originating from combustion of middle-eastern Mazout oil and of fat coal, both of which are rich in sulfur. Electric power stations using these types of fuels should be located in places removed from residential areas. Mortality from chronic bronchitis and from various acut diseases of the respiratory tract and the lung is definitely higher in towns where the air is polluted by sulfurous gas. With regard to the fight against air pollution, priority should be given to means for combatting pollution at the source such as, for instance, by a suitable choice of fuel, and by substituting public transportation for individual automobile driving in cities.

12692 APTIC NO. 30839

Bright, Cooper, Toivo Lamminen, James Mullaly, Forest Markowitz, and Stanford M. Singer

COMPARISON OF AIR POLLUTION FROM AIRCRAFT AND AUTOMOBILES. (PROJECT EAGLE). (FINAL REPORT). *Rutgers--The State University, New Brunswick, N. J., Center for Transportation Studies, FAA Contract W1-70-1919-1, Rept. FAA-NO-70-14, 187p., Sept. 1970. 88 refs.*

NTIS AD 713913

The 67 tons of pollutants emitted by automobiles carrying 29,000 commuters between Manhattan and the 11 satellite city transportation centers within the tri-state area of Connecticut, New Jersey, and New York, during the morning and evening rush hours, can be reduced to five tons by carrying them in aircraft powered by turbofan engines. Pollutants emitted yearly by automobile and aircraft transporting the same number of passengers to Newark, LaGuardia, and J. F. Kennedy Airports from New York County and the counties containing the 11 satellite city transportation centers are as follows: 4869 tons/year for automobiles and 380 tons/year for aircraft, in 1970. High density aircraft operations on the decks of oblong shaped and circular shaped Rutgers Aquadromes located at Manhattan would create carboxyhemoglobin levels of less than one percent at a distance of 100 m from the deck. Air pollution concentrations along a highway that would provide access for automobiles to a city center airport located in New Brunswick, N. J., can produce physiological effects which are in violation of the New Jersey air pollution alert standards. Thus, the drastic reduction in air pollution that is possible in providing air transportation in the tri-state area for daily commuters and the major airport users warrants establishing a demonstration air service.

12693 APTIC NO. 30829

Brown, T. D. and V. I. Hanby

HIGH INTENSITY COMBUSTION. *Preprint, American Society of Mechanical Engineers, New York, Fuels Div.; Inst. of Fuel, London (England); Inst. of Combustion and Fuel Technology of Canada, Ottawa (Ontario), p. 13.1-13.25, 1970. 33 refs. (Presented at the North American Fuel Technology Conference, Ottawa, Ontario, May 31-June 3, 1970, Paper F-NAFTC-2.)*

Published research on homo- and heterogeneous combustion systems indicates the importance of oxygen enrichment and temperature on combustion intensity. In the absence of those factors, the recirculation ratio is a dominant influence; in several cases, an optimum recirculation ratio exists for maximum combustion intensity. Combustion rates in heterogeneous oscillating combustion systems increase for all particle sizes as the pressure amplitude increases. Increases in combustion intensity will always lead to an increase in emissions of sulfur trioxide and oxides of nitrogen. (Author abstract)

12694 APTIC NO. 30859

Bush, A. F., J. J. Leonard, and W. H. Yundt

GAS ANALYSES IN LARGE FIRE EXPERIMENTS. FINAL REPORT - VOLUME III: APPENDIXES. *In: Project Flambeau... An Investigation of Mass Fire (1964-1967). California Univ., Los Angeles, Dept. of Engineering; Naval Radiological Defense Lab., San Francisco, Calif.; Forest Service, Berkeley, Calif., Pacific Southwest Forest and Range Experiment Station, OCD Work Order*

OCD-PS-65-26, DASA EO 850-68, UCLA Rept. 68-25, Work Unit 2536A, p. 33-90, 1969. 11 refs.

NTIS, DDC: AD 710981

Data from 13 experimental fires with a size range from one to 342 piles were reported. Fuel was pinyon pine and Utal juniper trees. Results from four fires described as heavy and light fuel plots and a two-story house fire were also reported. The sampling system consisted of a bank of continuous analyzers sequencing six inlets. Gases from the inlets were drawn through separate tubes out of the fire to the instrument trailer about 400 ft away. Pressure in the lines was kept constant. Gas sampling involved three separate types; a continuous sampling system, sequential grab samplers; and integrating samplers consisting of six midget impingers. Systems developed to analyze and sample the gases provided data that appear to be consistent with the general pattern of behavior of the fires and with other data collected. The gas analysis data are important in defining fire behavior, comparing experimental fires, evaluating mass fire related hazards, and testing and providing valid data for fire models. The measurement of water vapor concentration is essential to an understanding of mass fire, from the standpoint of defining internal environmental conditions, defining human exposure, and as a means of relating the combustion process to fuel parameters and true energy release rate. Dilution ratios based upon carbon dioxide concentrations can provide insight for the study of interaactions within the mass fire system. Smoke analyses are required in order to better understand the gross combustion process. Analyses of gases in the streets of large experimental fires suggest that sufficient oxygen for survival is available at ground level in such locations and that noxious gas concentrations are generally below hazardous levels over most of the fire history. Gas analysis data is given for oxygen, carbon dioxide, carbon monoxide, aldehydes, nitrogen dioxide, and nitric oxide. (Author abstract modified)

12695 APTIC NO. 30715

Cairns, E. J., E. C. Gay, V. M. Kolba, M. L. Kyle, A. D. Tevebaugh, and L. E. Trevorrow

LITHIUM/SELENIUM SECONDARY CELLS FOR COMPONENTS IN ELECTRIC VEHICULAR-PROPULSION GENERATING SYSTEMS. (REPORT NO. 2). *Argonne National Lab., Ill., Chemical Engineering Div., Contract AEC W-31-109-Eng-38, Proj. MERDC 175-69, Task IT662705A012/042 Interim Rept. 2, 86p., Nov. 1970. 15 refs.*

NTIS: ANL-7745

In a program to develop multikilowatt lithium/selenium secondary batteries for electrically driven Army vehicles and paste-electrolyte cells having lifetimes of 1000 to 2000 hours and 1000 to 2000 charge-discharge cycles, 17 cells were tested showing an ampere-hour efficiency of 0.92 and having the capability of delivering 52% of the theoretical capacity at the 1-hour discharge rate. Cycle lives of 10 to 13 cycles were obtained during operating times of 120 hours. The life-limiting facor has been the transference of selenium to the lithium electrode. Observed resistivity ratios (resistivity of paste/resistivity of salt) were typically greater (by factors of 1.1 to 1.4) than the theoretical values calculated from the Maxwell equation. The Maxwell values are assumed to represent the minimum attainable resistivity ratio. Six hundred-hour tests of the corrosion resistance of aluminum, beryllium mixtures, chromium, Haynes 25, Unitemp 605, niobium, and niobium-1% zirconium alloy to 20 at.% Li-Se mixtures at 375 C indicated that beryllium, aluminum, and chromium are the most resistant materials. (Author abstract modified)

12696 APTIC NO. 30389

Carlsson, Bernt-Olof

ENVIRONMENTAL HYGIENE PROBLEMS ASSOCIATED WITH BROILER PRODUCTION. *(Arbets- och omgivningshygieniska problem vid broilerproduktion). Text in Swedish. Nord. Hyg. Tidskr. (Stockholm), 52(1):22-31, 1971. 22 refs.*

A survey of environmental problems associated with poultry production has been conducted. Poultry production gives rise to dust that originates from feathers, manure, fodder, and litter. Inhalation of dust of similar origin has been reported to cause pulmonary diseases. Ammonia is formed from the anaerobic degradation of manure. Relatively high concentrations of dust and ammonia were found in the work environment, nine to 17 mg/cu m and 10-50 ppm, respectively, particularly during the last part of the breeding period and during cleaning of the chicken houses. Some means to reduce the concentrations of dust and ammonia are recommended, including an alternative performance of the ventilation system and new work methods. It is important that the contents of chemical disinfectants be declared by the manufacturers. The solid waste management may sometimes cause problems. The development of methods for reuse of the waste that has a high nutritive value as a fodder component is recommended. The proper location of the breeding units can help to control the odor problem. Some water pollution may arise from the slaughterhouse due to waste blood. This can be avoided by separate collection of the blood. (Author summary modified)

12697 APTIC NO. 30883

Eisenbud, Merril

SOURCES OF RADIOACTIVE POLLUTION. *In: Air Pollution. Arthur C. Stern (ed.), Vol. 1, 2nd ed., New York, Academic Press, 1968, Chapt. 5, p. 121-147. 30 refs.*

Atmospheric radioactivity originates from natural and artificial sources. Nuclides of radium cause ground level radioactivity which has been measured. Day to day variations depend on meteorological factors. Cosmic rays also produce various isotopes such as carbon -14. Artificially produced radionuclides originate either as fission products or activation products. Strontium-90 is an important fission product which can produce bone cancer or injury to the blood-forming tissue in the bone marrow. Cesium-137 can also be a health hazard. Mines, mills, and refineries produce waste gases. Air-cooled, boiling water, and pressurized water nuclear reactors can eliminate radioactive dust emission by filtration, delayed emission (since the radioactivity is short lived, a 30-minute delay between the air ejector and the top of the stack can cause the radioactivity to disappear), and recirculation of waste water, respectively. The greatest risk is of a reactor accident; many engineering precautions are taken to prevent this from happening. Several accidents are discussed. When used fuel is reprocessed, the greatest hazards come from iodine and krypton isotopes. Nuclear weapons can also produce contamination due to the fallout of radioactive dust. The fallout can disperse and then be deposited on the ground, which causes the hazard to man. Most of the worldwide fallout measurements have been of Sr-90, because this isotope is so much more toxic than other constituents of radioactive debris. A new potential source of atmospheric radioactivity is the use of nuclear energy for rocket propulsion.

12698 APTIC NO. 30165

Engstrom, Staffan

MODERN STEAM CAR WITHOUT WATER. *(Modern angbil kor utan vatten). Text in Swedish. Tek. Tidsk., 101(3):26-28, 31, 33, 34, 36, Feb. 1971.*

Ironically, the most efficient type of steam car, which condenses the steam after use for recycling, will probably not use water. Ordinary H2O is a poor choice for such an engine, due to its susceptibility to freezing, its poor lubricating qualities, its relatively high boiling point, and its need to be absolutely free of grease or oil impurities. The ideal medium for this purpose should have a freezing point below -40 C, be stable up to 500 C, have a vapor pressure of one bar at 100 C, and have good lubricating properties. It should be insoluble in lubricating materials, not be corrosive of normal construction materials at temperatures up to 500 C, have a high molecular weight, be nonflammable and nontoxic, and be moderately priced. One such substance is CP 34, also known as thiohene. Various types of motors are discussed: a turbine drive, a screw motor, and a modified type of piston motor. The engineering problems involved in automatic regulation, valves, condensors, accessories, batteries, fuels, safety, weight, space, and cost are discussed.

12699 APTIC NO. 30327

Engstrom, Staffan

THE STEAM CAR WHICH ALMOST SUCCEEDED. *(Angan som nastan dog). Text in Swedish. Tek. Tidskr., 101(3):40-42, Feb. 1971.*

Some type of steam-propelled land mobile has been on the market since the 19th century. The Stanley Company, which produces the Stanley Steamer, was one of only 126 steam car manufacturers, but was the most successful. The Stanley Steamer made its debut in 1899, and 200 cars were sold that year, and in 1910 there were 2500 sold, for a price ranging from $2800-4000. In 1906, a specially built Stanley broke the then world s record by traveling at 205 m/hr (127 mph). The disadvantages of the Stanley included the unpleasant odors, the noises, the dangers to visibility caused by clouds of steam emitted, and the 45-minute warmup time required. It also consumed an inordinate amount of water: 1.8 liters (0.75 gallons) per mile. An old-style steam car with greater prospects of success was first built in 1912. The company planned to build 10,000 chassis per year, and there were 11,000 orders for the cars, but the U. S. War Emergency Board declared this venture unnecessary to the war effort, and by the end of World War I there were difficulties in reviving plans for mass production. The Doble car required only 500 rpm to attain a speed of 50 km and did not require a transmission. The 1920 model could be accelerated from 0 to 75 mph in 10 seconds. After the 1929 Depression, Doble moved to Germany and continued to make improvements on his steam car. In 1951 he began collaborating with Robert McCulloch in the design of a sports car, but the project was abandoned in 1954, possibly because it was impossible to raise the 50 million dollars needed to initiate mass production.

12700 APTIC NO. 30439

Flanagan, J. E. and G. A. Hosack

THEORETICAL MODEL OF SOLID-WASTE COMBUSTION PROCESS. *American Society of Mechanical Engineers, New York, Incineratior Div., Proc. Natl. Incinerator Conf., Cincinnati, Ohio, 1970, p. 13-14, 65-70. 15 refs. (May 17-20.)*

An analytical model was developed to describe the combustion process for a traveling grate-type incinerator. Maximum simplification was imposed to determine the most influential parameters in the overall process. A thermochemical equilibrium calculation was used with the energy equations to obtain the combustion flame temperature and the product compositon for any given initial waste composition. The analytical results indicate that the combustion rate is very sensitive to the thermal conductivity of the combustion gases, the heat of pyrolysis of the solid waste, and the choice of the frequency factor and activation energy used in the surface pyrolysis Arrhenium expression. (Author abstract)

12701 APTIC NO. 30888

George, Ralph E., John S. Nevitt, and Julien A. Verssen

JET AIRCRAFT OPERATIONS: A THREAT TO THE AIR ENVIRONMENT. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 52p., 1971. 5 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 64th, Atlantic City, N. J., June 27- July 2, 1971, Paper 71-117.)*

A summary of the results of a comprehensive air pollution study of jet aircraft operations in Los Angeles is presented. Included in the data are jet engine exhaust measurements for currently used turboprop, turbojet, and turbofan engines, measurements of specific contaminants in the atmosphere inside and outside passenger terminals and ticketing areas, and in aircraft cabins during ground operations including passenger loading and taxiing prior to takeoff. Ambient air measurements in a two-mile radius of the airport are also presented. An evaluation was made of the emissions of contaminants from air transport operations and all related ground activities including motor vehicles that contribute to the total atmospheric burden at the airport. Jet aircraft emissions are compounded by emissions from collateral ground activities at airport terminals. These emissions are suffered not only by area residents but by other exposed persons in the airport environs. Aircraft contribute about 91% of the particulates and 44% of the carbon monoxide emissions. Carbon monoxide from ground emissions are more than 55% of the total CO emissions from all sources. Atmospheric CO levels average 4-11 ppm in residential areas adjacent to and circumscribing the airport. Aircraft passenger cabin concentrations of CO during taxiing and runway line-up procedures range from 2-7 ppm. These values are significantly lower than levels to which the air traveler is exposed during his stay at the air terminal. (Author abstract modified).

12702 APTIC NO. 30292

Goeij, J. J. M. de and J. P. W. Houtman

MERCURY IN THE ENVIRONMENT. *(Kwik in het milieu). Text in Dutch. Chem. Weekblad., 67(10):13-20, March 5, 1971. 62 refs.*

Studies using neutron activation analysis show the average mercury content of the lithosphere to be about 0.07 ppm. The erosion of rocks and soil containing mercury liberates about 2.5 million kg of mercury annually into the biosphere. The present mercury content of ocean water is 0.15 ppb. Total production of mercury has been estimated at about 10 million kg per year. Mercury used in thermometers and electrical equipment does not usually need replenishing. Mercury used in various chemical and metallurgical processes is partially lost to the environment, while mercury used for pesticides, batteries, paints, lubricants explosives, and fireworks is consumed beyond recovery. The literature on mercury pollution in Japan, Sweden, Canada, and the United States is reviewed, and original data are given from Dutch investigations. Certain industrial processes, such as the roasting of ores, can release mercury into the air. Some combustible materials, such as paper and textiles, contain fungicides with mercury content; it is also present in coal as a level of 0.4 ppm. Petroleum has been known to contain as much as 20 ppm and tobacco as much as 0.4 ppm. Mercury in the Toronto atmosphere was found at concentrations of 0.14 and 0.35 mg/cu m in 1962;

eight years later the levels were 0.25 and 0.75. A San Francisco study revealed that the mercury content of the atmosphere is strongly dependent on meteorological conditions. When the wind blew in from the ocean, a minimum of 1 mg/cu m was recorded. With a northerly wind in winter, values reached 15 and 25 mg, while in summer, when influenced by the industrial area of San Francisco, values reached 50 mg. Especially high values of mercury have been noted in conjunction with the occurrence of smog. The pollution of food with mercury and the direction of future research in technology and biomedicine are also discussed.

12703 **APTIC NO. 30687**

Hayashi, Miyoko and Satori Hayashi

ENVIRONMENTAL POLLUTION CAUSED BY PROCESSING POLY VINYL CHLORIDE RESIN. *(Enkabiniru jushikakokojo no kogai to kugai). Text in Japanese. Osaka-furitsu Koshu Eisei Kenkyusho Kenkyu Hokoku, Rodo Eisei-Hen (Proc. Osaka Public Health Inst., Ed. Ind. Health), (7):46-55, Sept. 1969. 7 refs. (Presented at the Japan Society of Air Pollution, Annual Meeting, 9th, 1968.)*

The exhaust gas components and the efficiency of the exhaust gas washing devices were investigated in two vinyl chloride resin processing plants, A plant and B plant. The conditions necessary for the occurrence of air pollution damage are discussed. The A plant is presently a source of air pollution, however, no marked air pollution damage has been found around the B plant. Gas chromatography was used for the analysis of exhaust gas components. A characteristic difference between the plants is that a bubbling process is included in the manufacturing process in the A plant. The complaints of the inhabitants living around the A plant were classified in two groups: irritation in the throat and coughing and nausea, vomiting, and headaches. It is believed that the former are due to the fumes of the plasticizer, especially DOP, and the latter are due to the mixed effects of the fumes and decomposed substances, such as DOP. The latter is also the indirect, psychological effect of the offensive odor. The exhaust gas washing device in the A plant, mainly composed of a jet collector, decreased the concentration of DOP or DBP down to 10%. However, the sensitive effect was not reduced proportionally. Also, the temperature of the exhaust gas is low, therefore, the complaints of the inhabitants have not decreased. Although the results of investigation suggested that the total amount of air pollution is almost the same in the two plants, the damage was found only in the area around the A plant. One reason for this may be that the pollutants are emitted in different ways by the two plants. Also, the B plant is located in a district with severe air pollution damage, so that a new air pollution source cannot be detected.

12704 **APTIC NO. 30603**

Hind, C. J.

AIR POLLUTION THROUGH EXHAUST GASES. *(Umweltverschmutzung durch Auspuffgase). Text in German. Antriebstechnik, 10(3):104-105, March 1971.*

Motor vehicles is operation in Great Britain used 4.79 million tons Diesel fuel and 13.2 million tons gasoline in 1969. If all gasoline engines were converted to Diesel engines, the emission of carbon monoxide would drop from 6.1 to 0.3 million tons, that of carbon dioxide would increase from 15.8 to 17.8 million tons, hydrocarbons would increase from 0.48 to 0.56 million tons, aldehydes would be reduced from 0.25 to 0.16 million tons, and sulfur dioxide emission would increase from 0.05 to 0.08 million tons. The differences are due to the circumstance that in contrast to the internal combustion engine, the Diesel engine never chokes the intake air; engine output depends on direct regulation of the quantity of fuel injected into the cylinder. Diesel fuels are lead-free. British medical authorities claim that no evidence exists that Diesel exhaust gases present a health hazard or that they are carcinogenic, even in case of vigorous smoke emission. Smoke and odors characteristically emitted by Diesel engines are a nuisance but not a hazard. In Europe, there are no two countries that would have identical or even comparable Diesel emission limiting regulations, partly because of the difference in testing procedures. A British norm promulgated in 1967 (BS/AU 141) is the strictest of all European norms stipulated maximum permissible smoke emission levels for a defined number of revolutions. But the norm has a weak point: it is applied to new vehicles but not in periodic compulsory automobile inspections. Standardization of testing procedures for all of Europe is highly desirable.

12705 **APTIC NO. 30893**

Nishida, Kazuo

MANY PROBLEMS FOR INDUSTRIAL WASTES FROM VIEWPOINT OF AIR POLLUTION. *(Sangyo haikibutsu shori ni tomonau taiki osen no shomondai). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):187, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, Tokyo, Japan, 1970.)*

Urban incinerators disposing industrial wastes generally produce approximately 200 ppm hydrogen chloride; 500-1000 C temperature creates approximately 100 ppm aldehydes. The new type of industrial waste also creates tremendous heat and requires much air, giving off 700 to 11000 Kcal/kg compared to 700-200 Kcal/kg from ordinary incinerators. This causes early damage to the structure of the furnace. The air required for burning ordinary wastes is 1.8 N cu m/kg per 700 Kcal/kg. But among the new types of industrial wastes, polyvinyl chloride monomer requires 4.5 N cu m/kg, pplypropylene, 11.6; and polyethylene, 11.5 N cu m/kg. The air percentage in the old type incinerator was 1.5-2.2 but incinerators for synthetic resins require 2.5-2.8. The actual maximum air requirement is as large as 30 N cu m/kg, and air supplying less than this will create soot. Chimneys of old incinerators cannot accommodate the amount of exhaust gas and small explosions might be caused in small chimneys. Some of the synthetic resins melt with low heat and create black smoke the moment they are thrown into an incinerator. All these new types of industrial wastes require a special method of incineration.

12706 **APTIC NO. 30600**

Hromek, Rostislav

REMOTE HEATING IN CENTRAL EUROPEAN CITIES. *(Zur Fernwaermeversorgung mitteleuropaeischer Grossstaedte). Text in German. Gesundh. Ing., 92(6):161-163, 1971.*

Central European cities all have one thing in common, they have a heating period of 230 days per year at an average temperature of five C and a lowest reference temperature of minus 15 C. A short while ago, only solid fuels were available for home heating. The individual domestic heaters which existed were gradually replaced by centralized heating systems for hygienic reasons. The attempt to abolish the disadvantages of this heating system, such as ash disposal and storage of large bulky fuel quantities, led to increased oil-heating. The problem of air pollution by domestic heaters was, however, not solved. The oil contains two to three percent sulfur, which requires the construction of high stacks. The concern for air pollution caused the cities to move their remote heating plants far outside the city limits.

12707 APTIC NO. 30891

Ikegaya, Hiroshi

AIR POLLUTION BY FERRO ALLOY ELECTRIC FURNACE (NO 2).

(Gokin tetsuyo kaihogata denkiro no taiki osen ni tsuite(dainiho)). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):184, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, Tokyo, Japan, 1970.)

Ferrosilicone furnace gas and dust quantities and temperature may be calculated from the quantity of electric consumed. The relationship between a theoretical quantity of gas emission and the air current was also discussed. The figures can be applied to the 75% ferrosilicone open type electric furnace exhaust gas (up to 10,000 K.V.A. electric furnace); however, 20 to 30% variations in figures can be caused by the shape of the hood at the top of the furnace, by the way the exhaust pipe is installed, or by the length of the hood and the skirt. In calculating the temperature, the operating method of the furnace and the individual furnace characteristic frequency and quantity of gas effusion at the time of smelting should be taken into consideration. Further studies are necessary in the operation of anti-pollution devices and the method of disposal of the dust collected from the exhaust gas.

12708 APTIC NO. 30438

Jansen, P., S. Jordan, and W. Schikarski

AN APPROACH TO COMPARE AIR POLLUTION OF FOSSIL AND NUCLEAR POWER PLANTS.

International Atomic Energy Agency, Vienna (Austria), Symp. Environ. Aspects Nucl. Power Stations, New York, 1970, 18p. 17 refs. (Aug. 10-14.)

NTIS: CONF-700-810-20

The calculation of the model to compare air pollution of fossil and nuclear power plants is discussed and an application of the model is given. The two models presented were without decay and with linear decay. With respect to the relative air pollution potential of coal fired power stations compared with nuclear power stations, it was concluded that in the scope of the model without decay, nuclear energy is better than coal by a factor of 180. The important advantage of nuclear energy over coal with respect to air pollution is the possibility to control and limit air pollution by locating reprocessing plants far away from populated areas. The improvement of technical means to reduce noble gas emissions of nuclear power plants is, in the case of a densely populated country, of minor effect if the reprocessing plant can not be remotely located. It was recommended that the removal mechanisms of air pollutants be investigated. Investigations should be carried out to reduce the krypton release in reprocessing plants.

12709 APTIC NO. 30818

Jay, Pierre

PCB-USES IN ASKAREL FOR ELECTRICAL INDUSTRY.

National Swedish Environment Protection Board, Solna, Research Secretariat, Proc. PCB Conference, Stockholm, Sweden, 1970, p. 18-25. (Sept. 29.)

In Sweden, various dielectric fluids based on chlorinated diphenyls (i.e, Askarels) are largely used by the heavy electrical industry in connection with transformers and capacitors. Most of the chlorinated diphenyls are contained in closed systems and losses to the environment, during manufacturing and use cycles, have been low. Such losses can be reduced still further by regenerating contaminated Askarels or by pyrolosis of that part which cannot be regenerated.

12710 APTIC NO. 30224

Jonge, H. F. de

THE NATO-CCMS CONGRESS ON AIR POLLUTION.

(Het NATO-CCMS congres over luchtvervuiling). Text in Dutch. Ingenieur, 83(16):267-272, April 23, 1971.

An international congress held Feb. 23-25, 1971, at Eindhoven, Netherlands, under the sponsorship of the NATO Committee on the Challenges of Modern Society, is reported. The meeting had a 3-fold task: 1) to report on systems for reducing automotive emissions, 2) to permit representatives of various countries to set priorities for a program to develop low-pollution power sources, and 3) to permit discussion among national and industrial representatives of international cooperation in pollution control and the formulation of specific recommendations for such cooperative ventures. U. S. activities to control pollution from automotive sources are described, including the Advanced Automotive Power Systems Program and the Federal Clean Car Incentive Program. A significant change in the philosophy of the American program has been from establishing norms on the basis of what is technically feasible to what is medically permissible. Alternate sources of power for the automotive vehicle are discussed, including the gas turbine, the Stirling motor (developed by Philips), the Rankine-cycle engine, a hybrid drive (a combustion engine delivering a lower level of driving power, supplemented by electrical energy from a strong storage battery), and the electrically-powered automobile. Experiments with electrically driven cars are being conducted in France (Citroen) and Japan (Datsun). The Argonne National Laboratories in the U. S. are also developing a lithium-sulfur battery, capable of producing 220 watt-hours per kilogram of battery weight. The Peugeot Company is working on a model operated by a methanol-air fuel cell. Although this is not completely emission free, an 11-passenger bus has been built on a trial basis, capable of carrying 175 kg of luggage and traveling at a speed of 95 km/hr.

12711 APTIC NO. 30421

Kaiser, Lmer R.

INCINERATION OF REFUSE–STATE OF THE ART.

Public Works, 102(4):77-79, 134, April 1971.

Incineration as a refuse disposal method will continue to develop because with this method, the weight of refuse is reduced to about one-fourth. When this residue is put in a landfill, the spac required is only one-twelfth that needed for landfill without incineration, allowing for compaction and settling in both cases. Furthermore, incinerators can produce steam for revenue. Design criteria, standards and allowable partticulate emissions, refuse, composition, the influence of packaging, recycling, re-use of metals and flyash, stack design, air pollution control methods, and site selection are mentioned. Several possibilities for thermal treatment of refuse are being explored. For example, it is possible to burn refuse with a deficiency of air in a rotary kiln, producing a rich, hot, combustible gas that can be burned with additional air under a steam boiler. The residue would contain metal, glass, ash, and a char rich in carbon. This could be quenched by water and the carbon separated for use as a boiler fuel or some other purpose. The volume of flue gas would be considerably less than that from conventional incinerators which are operated with 200 to 300% excess air.

12712 APTIC NO. 30721

Kappelmayer, Arnd

MODELING OF A BLAST FURNACE WITH AN EXTERNAL COMBUSTION SHAFT AND COMPARISON OF RESULTS WITH0 OPERATIONAL MEASUREMENTS. *(Modelluntersuchungen an einem Winderhitzer mit aussenstehendem Brennschacht und Vergleich der Ergebnisse mit Betriebsmessungen). Text in German. Technische Univ. Berlin (West Germany), Fakultaet fuer Bergbau und Huettenwesen, Thesis (Ph.D.), 1968, Berlin, West Germany, 111p. 76 refs.*

NTIS: N70-41260

Isothermal modeling of a blast furnace with an external combustion chamber at room temperature was undertaken to reveal the flow pattern of flue gas and air blast within the heat storing furnace lining. Two cupolas shapes and their effects on the flow patterns were investigated and these were correlated with temperature patterns. Convection heat transfer measurements in blast furnace channels supplied data for calculations which disclose the impossibility of deriving a generally valid equation for convection heat transfer in non circular channels. An equation was derived which fit the specific conditions under scrutiny. The temperature profile was derived from a mathematical digital simulation model. The resulting thermal pattern was much more exact than that resulting from conventional calculating methods. Results of calculations based on the flow profiles were in close agreement with operational measurements. The two cupola shapes yielded rather different temperature curves and thermal conditions. The mathematical simulation model derived can be applied to all blast furnaces.

12713 APTIC NO. 30638

Kubota Kimio, Tosho Ohira, Yasuo Iida, and Hajime Saito

METHOD OF INVESTIGATION FOR DRIVING PATTERN OF AUTOMOBILE IN METROPOLITAN TOKYO AND ANALYSIS OF ITS RESULTS - INTERMEDIATE REPORT. *(Tonai Jidosha no sokojotai no chosahoho to sono kekka no bunseki-chukan hokoku -). Text in Japanese. Tokyo-To Kogai Kenkyusho (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), vol. 2:82-87, March 1971.*

As field test was conducted with a car equipped to automatically measure and record the running speed of the car, the rpm of the engine, the opening of the throttle valve, and negative pressure of the intake pipe. However, the Foxboro differential pressure transducer used to detect the negative pressure was too bulky for installation inside the bonnet and was placed in the passenger chamber, thus requiring a longer connection pipe which resulted in delayed reaction of the transducer to the changing negative pressure. For this reason, the negative pressure detected in this test was as useful as expected. The test results were analyzed for idling, acceleration, constant-speed drive, and deceleration. Each mode except idling was broken down into finer speed groups for analysis of frequency, time, and time percentage for each speed group. A speed change within 5 km/h variation was considered a constant speed. The test was conducted on downtown streets, suburban streets, fringe area streets, and highways and the results from each test tabulated. According to the overall analysis of the driving pattern, the idling mode accounted for 34.3% of the total driving time, the acceleration for 17.3%, constant speed for 35.1%, and deceleration for 13.3%. For the downtown area, the values were 37.7%, 15.5%, 36.0%, and 10.8%, for the suburban area, 27.0%, 20.1% 37.2%, and 15.6%; for the fringer area, 38.1%, 16.3%, 32.1% and 13.4%; and for the highways, 13.5%, 7.1%, 73.1%, and 5.4%.

12714 APTIC NO. 30413

Laseter, John L. and Ricardo Valle

ORGANICS ASSOCIATED WITH THE OUTER SURFACE OF AIRBORNE UREDIOSPORES. *Environ. Sci. Technol., 5(7):631-633, July 1971. 4 refs.*

The airborne urediospores produced by two races of a common rust fungus (Puccinia graminis avenae) were washed with organic solvents and the washings chromatographically resolved. Final component characterisization was by infrared, ultraviolet, visible, and mass spectrometry. Alkanes (150 ppm average) ranged in chain length from C18 to C35. An array of organics which included several carotenoid-type pigments along with partially characterized high molecular weight ketones, esters, and a variety of aromatic compounds was also observed. The polar methanol fraction contained free fatty acids ranging in chain length from C14 to C24. The presence of an 18-carbon epoxy acid was also confirmed. Unsaturated acids were present in low quantities. The free acids in the surface washings were different in concentration from those obtained by total urediospores disruption, suggesting selective localization of certain lipids on or near the urediospore surface. (Author abstract)

12715 APTIC NO. 30205

Lefcoe, Neville M. and Ion I. Inculet

PARTICULATES IN DOMESTIC PREMISES. I. AMBIENT LEVELS AND CENTRAL AIR FILTRATION. *Arch. Environ. Health, 22(2):230-238, Feb. 1971. 7 refs.*

Air particulates were surveyed in a house with central ventilation and an electrostatic filter in the main air duct with the returning air sampled. The average counts, in the 0.3, 0.5, and 1.0 micron ranges, were related to the normal activities, children playing, house cleaning, and smoking. Counts in all ranges under minimal activity were differed significantly depending on whether the filter was on or off. Cleaning and dusting in the house overwhelmed the filter. Smoking one cigar in the house raised particle counts from 10-100 times. These particle counts stayed up for at least three hours when the filter was off. The counts returned to base line levels in 1-2 hours with the filter on. (Author abstract modified)

12716 APTIC NO. 30794

Luning, O. E.

AIR POLLUTION CAUSED BY HEATING PLANTS. *(Luchtverontreiniging door stookinstallaties). Text in Dutch. Gas (The Hague), 91(6): 239-245, June 1971. 15 refs. (Presented at the Retreat for Thermal Engineers, Utrecht, Netherlands, Sept. 15-16, 1970.)*

Recent years have seen a strong shift in the type of fuels used in heating plants. Before 1955, fuel oil had to be subsidized in order to compete with coal. In 1955, two thirds of the fuel consumed was coal and about one third was oil. For a number of reasons, including the discovery of new petroleum sources in the Middle East, oil consumption began to rise, so that in 1960 it represented 50% of the fuel used. At the present time, the ratio is 70% oil to 25% natural gas to 10% coal. It is estimated that before 1980 there will be an energy consumption equivalent to that produced by 120 million tons of coal, but that the energy sources will consist of 56% petroleum, 37% gas, 4% coal, and 3% nuclear power. Other estimates are made for the next decade, as to the percentages of the various fuels that will be used for domestic heating and small industries in comparison with big industry, their use in central heating, and the sulfur content of fuel oils. Is is expected that the use of fuel oil with more than two percent sulfur content will decline, to be replaced by low-sulfur oils. On this basis it is estimated that the amount of SO2 emitted will drop from about 415,000 metric tons per year to about 250,000. Natural gas is expected to almost replace coal as a fuel. On the other hand, the prospects with respect to traffic-generated pollution are less optimistic; about 14,000 tons of SO2 will be generated annually. Determinations made on the waste gases from the burning of solid waste containing five percent polyvinyl chloride indicate the presence of 5000 mg hydrogen chloride per cubic millimeter, or 3000 ppm. Some of this HCl is combined with the fly ash. At a temperature of 700 C, the presence of a slight amount of water vapor in the atmosphere leads to the formation of elemental chlorine. A report is given of measurements made: carbon dioxide, hydrocarbons, aldehydes, and nitrogen oxides generated by motor traffic; nitrogen oxides generated by various types of burners (gas and fuel oil). The waste gases coming from incinerators contained 50-150 ppm of nitrogen oxides.

12717 **APTIC NO. 30173**

Machacek, Cenek

TODAY S STATE AND CHIEF PROBLEMS OF DUST COLLECTING TECHNIQUE IN CERAMIC INDUSTRY. *(Soucasny stav a hlavni problemy odprasovaci techniky v keramickem prumyslu). Text in Czech. Stavivo, 49(2): 73-75, 1971.*

0The ceramic industry is characterized by processes and raw materials used which are inducive to the generation of dust at substantial rates. Typical are the following facts: the raw materials have always to be crushed and ground; frequently raw materials have to be completely dried, to make grinding technically possible; the manufacturing processes require a number of operations, most of which cause dust formation; and some of the technological operations must be carried out in a semi-dry or dry state, which eliminates the possibility of reducing dust formation by the use of materials in wet or plastic condition. A mitigating circumstance is that, while considerable dustiness occurs inside the buildings, the effect on outside air pollution is rather moderate. The ceramic industry processes silicic raw materials which, as a rule, contain silica (SiO2) which, when aspirated in the form of small particles contained in the airborne dust, may cause silicosis. The dust produced by grinding of quartz may contain as much as 92 to 95% free SiO2. Crushing can produce dust containing 84 to 88% SiO2. Cutting down dust formation at the source includes keeping existing dedusting equipment, such as exhaust fans and filtering devices, in good working condition.

12718 **APTIC NO. 30873**

Malunchuk, Myron

THERMAL ANALYSIS OF SODIUM METABISULFITE. *Preprint, Air Pollution Control Office, Cincinnati, Ohio, Div. of Health Effects Research, 13p., 1971 (?). 11 refs.*

Thermal decomposition of sodium metabisulfite in air at 25-1000 C was found to involve two major weight changes before the final formation of sodium sulfate. The first is an endothermic process, in which sulfur dioxide is evolved, leaving a residue of sodium sulfite. The second change leads to the formation of sodium sulfate by oxidation of the sulfite. There are, however, intermediate decomposition reactions, occurring at the second change, which lead to the formation of elemental sulfur and to incomplete recovery of the original sulfur in the final product. (Author abstract modified)

12719 **APTIC NO. 30598**

Masek, Waclaw

COMPOSITION AND CHARACTERISTICS OF DUST IN STEELWORKS. *(Sklad i wyglad pylu w przedsiebiorstwie hutniczym). Text in Polish. Hutnik (Prague), 37(11):553-556, 1970.*

The results of a study of properties of dust emitted by the metallurgical industry are presented, supplemented by electron microscope photographs of dust. The latter gives information on the finest components of dust, which are most harmful to the human organism. Dispersion curves of dust were measured. Two methods (sedimentation and aspiration) of sample taking are compared; they differ in the size of most numerous dust particles. Chemical analysis of the dust was carried out. Analysis by X-rays enabled specification of chemical compounds present. Inorganic compounds formed more than 50% of the dust. Specific surface of the dust was determined, which gives information on microstructure of dust. Analysis included dtermination of soot and 3,4-benzpyrene content.

12720 **APTIC NO. 30604**

Matthes, Dieter

REFLECTIONS ON THE PROBLEM OF AIR POLLUTION BY AUTOMOBILES. *(Ueberlegungen zum Problem der Luftverunreinigung durch Kraftfahrzeuge). Text in German. Tech. Ueberwach. Sicherheit Zuverlaessigkeit, 12(6):181-185, June 1971.*

The conditions under which pollutants are emitted by the internal combustion engine, ways in which their emission can be limited, the testing of engines for the emission of pollutants, legislation governing their maximum emission levels in the U.S.A. and in Europe, and alternative automobile propulsion systems are reviewed. Both in the U.S.A. and in Europe, maximum emission levels are in force for carbon monoxide and hydrocarbons only until 1974. Since no simultaneous reduction of CO, HC, and nitrogen oxides through measures affecting the thermodynamics and the kinetics of combustion in the engine can be expected within the next few years, a reduction of CO and HC can currently be accomplished only by means of afterburners and the catalytic oxidation of exhaust gases. A partial solution would be to feed the engine with a rich full mixture (lambda smaller than one) to reduce NOx emission to a simultaneously control CO and HC by afterburners, but this is unsatisfactory because it is uneconomical. No catalyst has been found which could withstand the presence of lead in gasoline; this, if catalytic oxidation of exhaust gases is to be introduced, lead will have to be eliminated from fuels. All measures designed to reduce pollution reduce the output of engines. Alternative propulsion systems are the internal combustion engine with rotary pistons whose high HC emission is compensated by higher combustion temperatures which potentiates the effectiveness of afterburners; engines fed by gaseous fuels which have very low CO and HC emission and tolerable NOx emission levels; gas turbine engines with low CO and HC emission which are used only for commercial vehicles because of cost of interest; the Stirling engine with low CO, HC, and NOx emissions whose construction problems have however not yet been solved satisfactorily; the steam engine with low CO, HC, and NOx emissions which is unwiedly, expensive, and uneconomical; and the electric engine which is emission-free but suffers from energy storage problems. All European legislation governing automobile emission limits should be promulgated by Common Market authorities.

12721 APTIC NO. 30670

Miyanohara, Takashi

PRESENT SITUATION AND ACTUAL CONDITION OF DISPOSAL OF PLASTIC0 WASTES IN CITIES. *(Toshi ni okeru purasuchikku haikibutsu no genjo to shori no jittai ni tsuite). Text in Japanese. Toshi to Haikibutsu (J. Solid Waste), 1(1):26-34, May 1971. 11 refs.*

The decreased durability of incinerators has been attributed to plastics combustion, which emits acidic gas, mainly hydrogen chloride. At the present rate, the plastic wastes contained in city garbage can be disposed of. However, in the future, if the ratio of plastics increases, they will be uneconomical to collect and transport. It will be necessary for factories producing plastics, to crush and compress their rejects. The fire grids, heat exchangers, ducts, and dust collectors in the incineration equipment are corroded by plastics combustion. In Yokohama City, 70% of the repairs needed in the combustion system are considered to be due to plastics. Polyethylene and polystyrene generate 9000-10,000 Kcal/kg calorific value, requiring much more air than city garbage does. The smoke issued and the water used for the control of incinerator temperature are pollution sources. Overestimating and underestimating the possible generation of high temperature from plastics causes waste or subnormal operation. When plastic is used as a reclamation material, it does not decompose, so that the reclaimed land becomes unstabilized. Yokohama City s garbage averages 1200-1300 Kcal/kg; it is expected to reach 1600 Kcal/kg in 1975. Chlorine in the city garbage averages 0.22%, with the maximum being 0.56%. At the outlet of incinerator, hydrogen chloride in the exhaust gas is 200-1400 ppm; at dust collector outlet, 100-500 ppm. From the hydrogen chloride it would generate the allowable amount of plastics, in general garbage is said to be about 30%.

12722 APTIC NO. 30373

Nanbu, Masao

ALKYLATION-MANUFACTURING OF MOTOR ALKYLATE (1ST SERIAL). *(Arukireshon-Mota arukireto no seizo (Dai ikkai)). Text in Japanese. Sekiyu Gakkai Shi (J. Japan Petroleum Inst., Tokyo), 14(5):344-348, May 1971. 11 refs.*

The outlook of alkylate manufacturing, the supply of raw materials, and the alkylation reaction are discussed. The alkylate, originally developed in 1939 in the U.S.A. as an additive for aircraft gasoline, is now widely used as an additive for automobile fuel gasoline. The U. S. manufacturing capacity of the alkylate is said to be equivalent to more than 6% of total crude oil refining capacity in the country. The alkylate content in premium gasoline should have reached 15% more by now. Assuming that premium gasoline contains the alkylate for 15%, Japan should have the alkylate, manufacturing capacity of 10,000 BPD. In actuality, however, the capacity is only 1250 BPD, and most of the product is for aircraft gasoline. There is a forecast that the alkyl content in premium gasoline will be increased up to 40% in the future, so that the alkylation boom will continue. Broken down by type of alkylation process, the sulfuric acid process accounts for about 70% of the total production capacity, and the hydrofluoric process for the remaining 30%. Both use butene or propylene as the raw material. Emergence of the alkylation industry in the U.S.A. owes much to the abundant supply of isobutane and low-grade olefine, produced as by-products from catalytic reforming or cracking processes. When the alkylation process in a particular oil refinery is to handle oil products produced in that refinery, the butane alone of the by-products can more than meet the necessary quantity of the raw material for the alkylation. However, when in alkylation plant comes in a large, international scale, one refinery can hardly supply the needed quantity of raw materials for the large alkylation plant. Sources of the supply should be secured by the following measures: several refineries installed in close vicinity; using ethylene produced from naphtha cracking, isomerization of n-butane and hydro-cracking of light-quality oil to make up for shortage of isobutane; and using propylene and butene produced from naphtha cracking, isomerization of n-butane to make up for shortage of isobutane. Various alkylation processes including the Friedel-Crafts Catalysts Method, Thermal Aklylation Method, Sulfuric Acid Method, and Hydrofluoric Method was briefly introduced. The basic mechanism of the alkylation process and substances formed by the alkylation reaction were described.

12723 APTIC NO. 30447

Nelson, Kenneth W.

NONFERROUS METALLURGICAL OPERATIONS. *In: Air Pollution. Arthur C. Stern (ed.), Vol. 3, 2nd ed., New York, Academic Press, 1968, Chapt. 37, p. 171-190. 16 refs.*

While sulfur dioxide from the smelting of copper, lead, and zinc has been the principal pollutant of interest in nonferrous metallurgy, gaseous and particulate fluorides from aluminum smelting are also of concern. Fluoride problems first came to attention because of adverse effects on grazing animals rather than effects on vegetation, as with SO2. The mining, milling, and concentrating of copper, lead, and zinc are discussed, as well as their refining and smelting, emissions, and controls. The mining and ore treatment of aluminum is considered, its electrolysis, and emissions and controls. Copper, lead, zinc, and aluminum produced from scrap are also discussed. The production of nonferrous alloys is noted.

12724 APTIC NO. 30799

Oosterwijk, A. R. Kolff van

THE MATERIAL ASBESTOS. *(Gebruik van asbest). Text in Dutch. Ingenieur, 84(14):37-38, April 3, 1970. (Presented at the K.I.V.I. Hygienic Engineering Department Meeting, The Hague, Netherlands, Dec. 17, 1969.)*

The etymology of the word asbestos, the sources of this mineral, the varieties of asbestos, and the properties of these, particularly chrysolite, amosite, and crocidolite are presented. Four countries supply 85% of the asbestos presently used: Canada, South Africa, Rhodesia, and the Soviet Union. A fifth important source is West Australia. The Netherlands used about 20,000 tons of the substance in 1968, whilee England and West Germany used 215,000 and 190,000 tons, respectively, in the same year. The fibers of chrysotile (white asbestos, the most commonly used form) have a diameter of about 0.02 micron, while amosite and crocidolite fibers have a diameter of two micron. In recent years, considerable study has been devoted to an apparent connection between the inhalation of asbestos fibers and a particular type of cancer. Given the increasing industrial importance of the substance, medical studies of this type can have major significance.

12725 APTIC NO. 30867

Pascasio, F., G. Scassellati Sforzoline, and A. Savino

TAR AND NICOTINE CONTENT BOTH IN INHALED SMOKE AND IN SMOKE DISPERSED IN ROOM AIR BY VARIOUS CIGARETTE BRANDS. *Ann. della Sanita Pubblica (Rome), 27(5):971-978, 1966. 12 refs. Translated from Italian. Herner and Co. 9p.*

A study of the tar and nicotine content in inhaled smoke and in room smoke spread by certain types of Italian cigarettes, both filtered and unfiltered, was conducted. A device was used which allowed the separate collection of inhaled smoke and room-air smoke. The results show that the tar content was lower in inhaled smoke of a filtered cigarette than in an unfiltered one; the results were almost identical for the room-air smoke of these two types of cigarettes. Nicotine content is lower in the inhaled smoke of the filtered cigarette than in that of the unfiltered type. Nicotine content is higher, however, in the room-air smoke of the filtered cigarette. The relationship between room-air smoke and inhaled smoke for each type of cigarette was alo studied. The tar content of unfiltered cigarettes ranged from 1.25 to 1.89, while in the filtered cigarette it was from 2.79 to 4.27. For the nicotine content, the unfiltered cigarette showed a relationship between room-air smoke and inhaled smoke varying from 1.36 to 1.81; in the filtered cigarette the range was from 2.52 to 3.51. It is concluded that the air of a room where people smoke is polluted with a quantity of tar and nicotine constantly higher than that inhaled by the smoker.

12726 APTIC NO. 30710

Peterson, Alf

PCB - POSSIBILITIES OF DESTRUCTION. *National Swedish Environment Protection Board, Solna, Research Secretariat, Proc. PCB Conf., Stockholm, Sweden, Dec. 1970, p. 83-87. 11 refs. (Sept. 29.)*

The thermal decomposition of polychlorobiphenyls (PCB) at high temperature (1000-1500 K) was investigated. Thermodynamic calculations of the systems showed that hexachlorobiphenyl at 1200 K, decomposes to hydrogen chloride, chlorine, and carbon if there is no oxygen present. When oxygen is added to the system in amounts of less than six moles per mole of hexachlorobiphenyl, carbon monoxide is also formed. Some experiments with tetra and hexachlorobiphenyls showed that these substances were rapidly and completely destroyed when exposed to air at 900-950 C. In the gas streams from the reaction tube, carbon dioxide and chloride were easily detected. Dry tipping and incineration of liquid PCB was described. Solid waste containing PCB does not necessarily have to be incinerated. It is possible to leach such wastes with a suitable solvent and deposit the decontaminated waste. The solution containing PCB may be incinerated or separated by distillation into PCB, which may be reclaimed, and the solvent used again. A suitable solvent was acetone.

12727 APTIC NO. 30706

Poole, W. Kenneth and Donald R. Johnston

ESTIMATING POPULATION EXPOSURE TO SELECTED METALS - MANGANESE. (FINAL REPORT). *Research Triangle Inst., Research Triangle Park, N. C., NIEHS Contract PH-86-65-109, RTI Rept. AU-229, Rept. NIH-ES-2433, 165p., Oct. 1969. 85 refs.*

Three aspects of manganese in the environment are discussed: the flow of manganese from the time it is mined or imported until it is consumed; the exposure of subpopulations occupationally exposed to manganese; and the exposure of the general population to manganese via air, food, and water. Cases of manganese poisoning have been reported in every manufacturing process which involves the use of manganese in appreciable amounts. The environmental concentrations of manganese have been found to be high in different industries where dry manganese ore or oxide is handled. This occurs in mining and beneficiation, manganese refining, manganese alloy production, metal production, dry-cell battery manufacturing, and in certain aspects of steel making. If a daily respiratory volume of 20 cu m and a daily manganese concentration of 0.10 milligram/cu m are assumed, the average urban dweller inhales 2.0 milligrams/day. Since all of the 2.0 milligram is probably not deposited, this estimate may be too high. The manganese concentration in various foods is presented in tabular form. Assuming a daily water consumption of two liters, the estimated median daily dose from drinking water is 10 milligrams.

12728 APTIC NO. 30230

Reimer, Hans

THE EMISSION OF HYDROGEN CHLORIDE BY THE COMBUSTION OF SYNTHETIC- CONTAINING DOMESTIC REFUSE. *(Ueber die Emission von Chlorwasser- stoff bei der Verbrennung von kunststoffhaltigem Hausmuell). Text in German. Chemiker Ztg. (Heidelberg), 95(10):455-457, 1971. 5 refs.*

Incineration of domestic refuse may lead to greater air pollution by hydrogen chloride since the quantity of chlorinated polymers in refuse is increasing. The relationship between the polyvinyl chloride content of refuse and the HCl concentration in the flue gas was determined at an incinerator equipped with a forward-stoking grate. Prior to the measurements, vegetable, bread, paper, wood, leather, organic matter, synthetics, metal, glass, and stones in the refuse were spearately weighed. The volume flow of the flue gases was determined by scanning the square cross section of the flue-gas duct. Five series of measurements were taken, with increasing concentrations of chlorine-containing refuse, primarily PVC, from 2 to 10% by weight. An almost linear relationship was found between the PVC content in the refuse and the HCl concentration in the flue gas. The chlorine balance (chlorine content in the incinerated PVC and chlorine content in the flue gas, slag, and fly ash) revealed that the major quantity of chlorine leaves the incinerator by way of the flue gas.

12729 APTIC NO. 30420

A HYBRID IN THE CITY. *(Hybrid i storstad). Text in Swedish. Tek. Tidskr., 101(3):22-23, Feb. 1971.*

The hybrid car is an attempt to combine the advantages of a car driven entirely on an electric storage battery (greater efficiency, less environmental pollution) with those of the conventional gasoline-driven vehicle (longer driving range and better acceleration). The result is actually a compromise between these properties. The hybrid car does give off some undesirable pollutants but offers the advantage of a combustion motor that operates at uniform speed, since its main function is to charge a battery. It is about as noisy as the conventional car, and is by nature more complex than either of its parents. The weight of the hybrid is also a compromise between the two pure types. Results are given of tests made with a four-passenger hybrid car designed by the Rollab Company (Fiat 128 chassis) on city streets and country roads. The hybrid car provides a workable compromise, within the reach of present-day technology. It may still be impractical for long trips made at high speed, but statistical studies indicate that 80% of all vehicles are driven less than 32 km (20 mi) per day.

12730 APTIC NO. 30457

Ruch, R. R., Harold J. Gluskoter, and E. Joyce Kennedy

MERCURY CONTENT OF ILLINOIS COALS. *Illinois State Geol. Surv., Environ. Geol. Notes, no. 43:1-15, Feb. 1971. 7 refs.*

A neutron activation method with a sensitivity of 0.01 ppm and a precision of + or 20% was used for the determination of mercury in coal. Fifty-five raw coal samples from 10 coal seams in Illinois had a mean mercury concentration of 0.18 ppm and a mode between 0.10 ppm and 0.12 ppm. Eleven coal samples from other states had mercury concentrations within the same range, or slightly lower. Three coal samples were individually separated into specific gravity fractions in the laboratory; all exhibited a mercury reduction of at least 50% in the lightest coal fraction and a concentration of mercury in the heaviest fraction. A significant part of the mercury was associated with the pyrite in the coal, and the remainder (perhaps up to 50%) was in organic association.

12731 APTIC NO. 30427

Sami, Hiroshi and Mitsunobu Ogasawara

STUDY ON THE BURNING OF A FUEL DROP IN HEATED AND PRESSURIZED AIR STREAM. *Bull. JSME (Japan Soc. Mech. Engrs.), 13(57):395-426, March 1970. 23 refs.*

To elucidate the combustion process in diesel engines, the burning characteristics were investigated of a fuel droplet injected intermittently into hot and highly pressurized air. Pressure was varied from 0.4 to 16 atm, temperatures varied up to 600 C from room temperature, and the velocities varied up to the flame transition air velocity. Burning rate, the flame shape, and the flame transition air velocity were measured by means of the sphere kernel method. Methanol, n-butanol, and kerosene were used as fuels. When the temperature is raised, the flame transition air velocity rapidly increases, while the burning rate scarcely changes. When the pressure is raised with the velocity, the burning rate increases remarkably, and when the temperature and the pressure are raised, the flame becomes long and soot formation increases. Applying the law of similitude to the fundamental equations and the boundary conditions governing the droplet combustion phenomenon, empirical formulas giving the burning rate and the flame shape were derived. Experimental data on the flame transition air velocity are summarized into an empirical formula.

12732 APTIC NO. 30185

Schwibach, J.

ENVIRONMENTAL ASPECTS OF NUCLEAR POWER PLANTS. *(Umweltaspekte von Kernkraftwerken). Text in German. Tech. Ueberwach. (Duesseldorf), 12(6):173-180, June 1971. 29 refs.*

Problems of radioactive waste water and air from nuclear power plants are discussed. The pollution of the environment by nuclear power plants is compared with that by conventional power plants. Fossil fuel-fired power plants in the U. S. emit 19 million tons of sulfur dioxide and four million tons of nitric oxide annually. By the year 2000, these quantities will have probably risen by a factor of five. Despite high waste gas stacks for the dilution of SO2 in the vicinity of the power plants, considerable low-level concentrations can be found as far distant as 15 to 35 km during unfavorable weather conditions. It is, therefore necessary to study the dilution of pollutants in large areas during unfavorable weather conditions. Coal-fired power plants emit fly ash which contains natural radioactivity. Studies in older power plants revealed that the products of the uranium and thorium radioactive series in the fly ash have the activity of normal soil.

12733 APTIC NO. 30446

Sebesta, William

FERROUS METALLURGICAL PROCESSES. *In: Air Pollution. Arthur C. Stern (ed.), Vol. 3, 2nd ed., New York, Academic Press, 1968, Chapt. 36, p. 143-169. 40 refs.*

Coke, sinter, iron, and steel production and foundry operations are discussed, including process emissions and their control. Bessemer converters, open hearth furnaces, electric arc furnaces, basic oxygen furnaces, and scarfing are included in reviewing steel manufacture, and cupolas and electric melting furnaces are considered in foundry operations.

12734 APTIC NO. 30851

Somers, Joseph H. and George D. Kittredge

REVIEW OF FEDERALLY SPONSORED RESEARCH ON DIESEL EXHAUST ODORS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 39p., 1971. 17 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 64th, Atlantic City, June 28-July 2, 1971.)*

Projects sponsored by the Air Pollution Control Office over the past years in the field of diesel exhaust odor are summarized. These investigations have concentrated on developing measurement methods for quantifying different odor levels, evaluating various odor control methods, and evaluating public opinions of such odors. A human panel method using odor reference standards has been found suitable to measure these odor levels. In addition to this technique, chemical characterization work has been jointly sponsored by the Coordinating Research Council and the Air Pollution Control Office to isolate and identify those species responsible for the odor. Knowledge of these odorous compounds and the techniques necessary to isolate them should lead to development of a chemical method to measure this type of odor, in place of human panelists. Such basic information would also lead to developing control techniques to minimize this odor. Several control techniques were evaluated for diesel exhaust odor. To date, the only effective method is an improved needle injector for use in the Detroit Diesel type E 6V-71 engine commonly used in buses. Finally, public objections to diesel engine exhaust were measured. A systematic relationship exists between increasing public objections and increasing odor intensity. (Author abstract modified)

12735 APTIC NO. 30436

Spinrad, B. I.

THE ROLE OF NUCLEAR POWER IN MEETING WORLD ENERGY NEEDS. *Preprint, International Atomic Energy Agency, Vienna (Austria) and Atomic Energy Commission, Washington, D. C., 34p., 1970. 12 refs. (Presented at the Symposium on Environmental Aspects of Nuclear Power Stations, New York, Aug. 10-14, 1970.)*

NTIS: CONF 700-810-46

The expected electrical capacity (GW) and share of total capacity (%) of nuclear power stations throughout the world are projected for the periods 1970-1985 and 1985-2010. In addition, fuel cycle costs are listed for today s low enrichment thermal reactors and future fast breeder reactors. Among qualitative reasons cited for the expected nuclear dominance is the fact that the intrinsic cost of nuclear energy, in terms of energy available from the U(235) extracted from natural uranium, is almost one order of magnitude lower than for competitive fossil fuels. There is also the intrinsic compactness of nuclear fuel and the compactness of effluent from nuclear energy, the latter minimizing the environmental impact of nuclear energy. Due to the inclusion of safety systems, nuclear reactors will probably always be more expensive than gas or oil-fired power plants. However, many fossil-fuel systems are faced with expensive modification to cope with pollution control requirements. Greater control can be achieved at a modest cost to ensure decreased environmental stress from nuclear power plants.

12736 APTIC NO. 30765

Starkman, Ernest S.

THE FUTURE OF VEHICULAR POWER PLANTS. *Arizona Univ., Tucson, Engineering Experiment Station, Proc. Air Pollution Control Seminar, Tucson, Arizona, 1970 p. 12-52. 24 refs. (Feb. 13.)*

California 1975 standards for automobile emissions are one-half gram/mile of hydrocarbons, 12 grams/mile of carbon monoxide, and gram/mile of nitrogen oxides. Similar standards are expected to be set by the federal government. The ability of conventional gasoline engines to meet the 1975 limits is demonstrated by published results for experimental systems. Among alternative powerplants, only the steam engine, the Stirling engine, and possibly the gas turbine can meet the 1975 requirements.

12737 APTIC NO. 30376

Tachikawa, Ryo

MECHANISM OF BHC POLLUTION. *(BHC oden no mekanizumu). Text in Japanese. Kagaku Asahi (Sci. Asahi), 30(12):45-51, Dec. 1970.*

The compound benzene hexachloride (BHC) is used as an insecticide in Japan. Beta-BHC is hard to dissolve in water, remains longer, and its toxicity is greater than alpha-BHC. More alpha-BHC is used in western Japan, especially on Northern Kyushu Island. When applied to agricultural water, BHC is diluted and flows in to the rivers and sea. Because of its wide use there is hardly any fresh water unpolluted by BHC. Even though the residual concentration in the water and soil may be low, it condenses in living animals. It is adsorbed by the surface layer of soil up to 10 cm and when it rains, BHC is slowly dissolved in the water and readsorbed by the plants. The gaseous BHC is broken down by ultra-violet rays and enters the atmosphere but some comes back in the rain, and enters the water cycle. Due to paddy field rice cultivation alpha-BHC and DDT are broken down quickly. During the cultivation season, the BHC concentration reaches 10 ppb in the big rivers and a few dozen ppb in the smaller streams. The Inland Sea has a maximum 0.1 ppb BHC from summer to autumn. In Matsuyama City, more than 10 ppb were found in rain water four times a year and once, on July 4, as much as 144 ppb BHC were found. During the summer, sometimes beta-BHC exceeds alpha-BHC. In a medium-sized city such as Matsuyama, the BHC sprinkled in the field gets to the center of the city within a day. In nine cities west of Tokyo, 0.1 micrograms BHC were detected per 1 cu m. Even on the top of Mt. Ishizuchi (1981 m) or in the snow of the Shikoku mountainous areas, BHC is detected in very small amounts. The allowable limit for adults is 0.6 mg per day, which is derived from beef and dairy products. The test for chronic toxicity is technically very difficult. The allowable limit of BHC (alpha-BHC only) is set for food items such as summer oranges, and grapes, but not for milk, beef, dairy products, or rice. Although use of BHC and DDT decreased this year, other insecticides are expensive. Low-toxicity agricultural chemicals must be developed and the safe use of existing ones must be studied.

12738 APTIC NO. 30830

Ternisien, A. J.

THE POLLUTION AND THE NUISANCES OF INDUSTRIAL AND URBAN ORIGIN. *(Les pollutions et les nuisances d origine industrielle et urbaine). Text in French. Premier Ministre, Delegation generale a la recherche scientifique et technique, 111p., June 1966.*

This publication contains definitions and descriptions of the various areas of air and water pollution and of acoustic nuisances. Epidemiology, the pathological effects of pollution, occupational diseases, reactions of humans to toxic substances, non-carcinogenous chemical agents, carcinogenous chemical agents, and acoustic agents are included. Inhaled noxious pollutants and their effect with regard to chronic and acute diseases, radioactive substances, bacteria, and viruses are also discussed. The next chapter is devoted to water pollution, with detailed discussion of detergents and pesticides. Typical figures of the composition of clean air and polluted air respectively in towns are presented, including the composition of smog, chemical reactions in the atmosphere, and the international standardization of methods of sample taking and quantitative determination of air pollutants. A special section on acoustics deals with standardization of measurements, and describes the principal sources of noise generation in homes, on the roads, and in industry, also giving a scientific analysis and explaining various apparatus related to the study of acoustic details. A substantial part of the publication is devoted to the technical means for eliminating air pollutants in the form of dust and fumes, or reducing the concentration in which they occur, with special emphasis on improved methods of controlling combustion. Legislation, codes, and administration are discussed.

12739 APTIC NO. 30296

Teworte, W.

THE USE OF FLUORINE-BEARING MATERIALS IN THE GERMAN FEDERAL REPUBLIC. *(Einsatz von fluorhaltigen Materialien in der BRD). Text in German. VDI (Ver. Deut. Ingr.) Ber., no. 164:11-18, 1971. 13 refs.*

Before World War II, Germany was the world s largest supplier of fluorine. In 1938, it produced 30% or 140,000 tons out of a total world production of 462,000 tons. Since then, the situation has changed completely. In 1969, the world consumption amounted to about 3.6 million tons, out of which Mexico as the largest producer provided one million tons; Germany s participation was only 90,000 tons which placed it eighth after Mexico. This latter production was practically used up completely by the domestic industry; in addition, some 160,000 tons were imported to cover the overall demand of 250,000 tons. Of the world s consumption of fluorine in 1969, 45% were used for steel manufacturing, 15% for aluminum, 33% for producing chemicals, and 7% for glass and ceramics. The chemical industry requires fluorite, CaF2, primarily for producing hydrofluoric acid, HF. Two tons of CaF2 are needed for producing one ton of HF. Hydrofluoric acid in turn is used as an intermediate product for the manufacture of numerous inorganic and organic fluorine compounds. Among the inorganic compounds are aluminum fluorides, used as flux material in the production of primary aluminum. The organic fluorine compounds include the aliphatic chlorine-fluorine-hydrocarbons, such as freon, which are used as spraying and cooling substances. Other important fluorine- bearing products are synthetic materials, such as teflon. Direct applications for fluorspar can be found in the manufacture of steel, of welding electrodes, enamel, glass wool, and other industrial products.

12740 **APTIC NO. 30218**

Tichatschke, J.

STUDIES OF THE EMISSIONS FROM REFUSE INCINERATORS. *(Untersuchungen ueber Emissionen aus Muellverbrennungsanlagen). Text in German. Mitt. Ver. Grosskesselbesitzer, 51(3)219-223, June 1971. (Presented at the VGB - Fachtagung Muellverbrennung 1970, Salzburg, Austria Aug. 28, 1970, Hamburg, West Germany, Sept. 11, 1970, and Koln, West Germany, Sept. 25, 1970.)*

In an experimental refuse combustion furnace, with a throughput of 20 t/hr at a heating value of 1600 kcal/kg, measurements of the gaseous emissions were taken over a three year period with an electrically heated quartz probe and a subsequent electrically heated quartz wool filter. The sampling point was at the boiler end after the economizer. The waste gas temperature at this point was 220 C. For determination of sulfur trioxide, absorption in 80% isopropanol and photometric methods were used. Sulfur dioxide was absorbed in an iodine solution. Prior to this method, the gravimetric method was used. The chloride content of the flue gases was determined with the mercury(II)-oxide-cyanide method. For this purpose, 50 to 100 liters of flue gas were drawn through a scrubber. For hydrogen fluoride measurements 500 liters of flue gas were drawn through a fritted gas scrubber. Diluted sodium lye was used as absorption solution. The volatile organic acids and aldehydes were also determined. The hydrogen chloride, hydrogen fluoride, and sulfur dioxide concentrations rose gradually over the years. For HCl, a maximum concentration of 18 mg/cu m was measured. For SO_2, the frequency maximum ranged from 0.8 to one g/cu m. The most frequently measured SO_3 concentration was 0.03 g/cu m. For CH_3COOH, a maximum concentratio of 120 mg was measured, and for HCHO, of 200 mg/cu m. The ammonia content, which was measured over a period of two years, ranged from 0.5 to 4.5 mg/cu m. No hydrogen sulfide, chlorine, or phosgene could be detected. The odor of the gases became more pronounced as the temperatures dropped to below 650 C. Rain water samples taken just beneath the smoke plume from an incinerator revealed that the rain is influenced by the waste gas, but is not a concentrated acid.

12741 **APTIC NO. 30674**

Ullman, William W.

LEAD IN THE CONNECTICUT ENVIRONMENT. *Conn. Med., 35(6):360-362, June 1971. 12 refs.*

Lead in the environment of the state of Connecticut is discussed. A task force has been active in reviewing all aspects of the hazards associated with lead-based paints and in developing recommendations to help formulate preventative programs. The main source of atmospheric lead is automobile gasoline. Approximately 70% of the lead in gasoline is exhausted from the tail pipe. Approximately half of the exhausted lead becomes airborne; about 250 million pounds of lead are discharged into the air each year from automobile exhausts. Industries burning coal and discharging airborne soil particles may also contribute to the lead present in ambient air. The absorption of lead in the respiratory tract depends on a number of factors, including the solubility of the compound and the particle size. It is estimated that lead inhaled from the atmosphere of Connecticut ranges from 0.001 to 0.05 mg/day. In a heavy smoker, a few micrograms per day of lead may be added to the body burden. The average smoker will absorb 10 mg of lead more/day than a non-smoker. The presence of lead in food and water is also discussed.

12742 **APTIC NO. 30391**

Ulvonas, Staffan

WHY DOES THE ELECTRIC CAR LAG BEHIND? (Varfor drojer elbilen)? Tek. Tidskr., 101(3):16-18, Feb. 1971.

In 1899 the electric automobile was the first such vehicle to travel faster than 100 km per hour, and a few years later, it had reached speeds more than twice that fast. The invention of the electric starting motor for gasoline cars in 1910 eclipsed the electrically powered vehicle, but in Great Britain there are presently 50,000 electrically powered vehicles that deliver milk and bread. A shortage of fuel in war time prompted a temporary interest in electric cars, but the latest impetus to research in this area is the problem of environmental protection. During the 1960 s, high hopes were entertained with respect to the use of fuel cells, but interest has now declined for several reasons, including the fact that a very special and expensive type of fuel is needed to meet the demands of fuel cell operation. Ford Motors and General Motors have announced the discovery of storage batteries with especially high concentrations of energy. The Ford battery, using sulfur and sodium, operates at 300 C, the GM lithium chloride battery at 600 C. However, due to the unsolved technical problems and safety considerations (such as dealing with highly unstable materials), this type of improved battery offers very little for the near future. A more promising project at present is the development of metal-air batteries. Currently using zinc, cadmium, and iron, these batteries have energy concentrations up to three to five times that of the lead battery. Research in this area is being conducted on a global scale. At least five years must be allowed before any such battery can achieve full-scale commercial production. Also described are various types of hybrid power. The present range of battery-powered two-passenger vehicles is 50-80 km, the maximum speed is 70 km/h, and an acceleration to 50 km/hr in 10 seconds.

12743 **APTIC NO. 30698**

Varga, John, Jr.

A SYSTEMS ANALYSIS STUDY OF THE INTEGRATED IRON AND STEEL INDUSTRY. (FINAL REPORT). *Battelle Memorial Inst., Columbus, Ohio, NAPCA Contract PH 22-68-65, 518p., May 15, 1969. 316 refs.*

NTIS: PB 184577

A general description is presented of the various processes used in each manufacturing segment of the iron and steel industry, including process block-flow diagrams and schematic drawings for each process segment. Particulate and gaseous emissions from each manufacturing process are identified at the point of emission. The flow of sulfur through representative models of the process segments is traced. A comprehensive and quantitative review of fuel and energy utilization was undertaken to identify the total industry consumption types of fuel used, quantities of each, the determinants of fuel choice, and the influence on pollutant emissions of fuel chemistry and usage. Industry growth and process technology changes are projected for the periods 1970-1975 and 1975-1980, emphasizing processes that will come into future use and their associated pollution potential, as well as processes which will be phased out. The principal types of control equipment for the various processes are described, and information on the performance characteristics of the various designs in use is presented. An in-depth analysis of the relative merits and limitations of applied control equipment is included. Pollution control alternatives are identified, with the relative cost and effectiveness of each compared. Gaps in air quality control technology are indicated, and recommendations are suggested for research to fill such gaps.

12744 APTIC NO. 30613

Wasilewska, Janina and Urszula Krause

PROPERTIES OF DUST EMITTED BY METALLURGICAL PLANTS. *(Wlasnosci pylow emitowanych do atmosfery przez urzadzenia hut zelaza). Text in Polish. Wiad. Hutnicze (Katowice), 27(2): 57-61, 1971. 16 refs.*

Chemico-physical properties of dust emitted into the atmosphere by metallurgical plants were studied. The method of determination of these properties is described, as are the method of sample collection and apparatus used. The chemical composition and density of the dust were determined; its fractional analysis was performed. The gases emitted into the atmosphere by metallurgical industry contained mostly carbon, silicon dioxide, and iron oxides; the relative amount depended on the character of a specific plant. Thus gases emitted from blast furnaces contained 33% carbon, 23% SiO2, 7% iron oxides; those from steel works, 51-55% iron oxides; and gases from foundries, 89-92% SiO2. The latter appear to be most hazardous to human health, since the gas causes fibrosis of lungs. A quantity of 45% dust from foundries consisted of particles with a diameter less than 20 micron. Fractional composition of dust varied according to plant; the finest is the dust from steel works. The fraction with a diameter lower than 5 micron formed 60%, out of which a considerable part was of a diameter between 0.5-1 micron. Because of its fine structure, the dust emitted by steel works does not settle to the ground, which indicates the necessity of using dust collectors. Further utilization of the steel works dust rich in iron oxides is suggested such as sintering the dust and returning it to production in this form.

12745 APTIC NO. 30701

Weiner, Jack and Lillian Roth

AIR POLLUTION IN THE PULP AND PAPER INDUSTRY. *Inst. Paper Chem., Bibliog. Ser., no. 237:1-224, 1969. 769 refs.*

A bibliography on air pollution is given limited to problems of the pulp and paper industry. A subject and author index are also included. The bibliography includes control methods, measurement methods, analytical methods, odor counteraction, air quality studies, specific pollutants, and so on.

12746 APTIC NO. 30267

Wright, Edward S.

AUTO POLLUTION SOLUTION: THE GAS TURBINE? Mech. Eng., 93(6):25-27, June 1971. 18 refs.

Properly designed gas turbine engines for vehicular applications offer significant potential for abating air pollution caused by internal combustion engines. Even without nitrogen oxides reductions, total untreated emissions (unburned hydrocarbons, carbon monoxide, and nitrogen oxides) of the gas turbine are likely to be only 50% of a treated Otto cycle gasoline engine which meets the 1975 standards and less than 3% of an untreated engine. One significant requirement of automobile gas turbines that must be adequately satisfied in design is the ability to withstand the thermal stresses associated with the frequent changes in power. At the present time, production costs of the gas turbine appear too high for serious competition with reciprocating engines. Since material costs represent 85% of the manufacturing costs, their reduction is of primary interest.

12747 APTIC NO. 30291

Zeedijk, H.

INCREASING SULFUR DIOXIDE EMISSIONS IN THE NETHERLANDS. *(Toenemende emissie zwaveldioxide in Netherland). Text in Dutch. Chem. Weekblad, 67(15):10-15, April 9, 1971. 17 refs.*

The maximum permissible 24-hour level of sulfur dioxide in the atmosphere is from 0.1 to 0.2 ppm, or 270-540 micrograms SO2/cu m of air. Over a longer period of time, the acceptable average concentration is considerably less. There is a scarcity of figures on SO2 concentration in the Netherlands, but SO2 estimated emissions increased despite an increased use of natural gas almost completely free of sulfur from an important source recently discovered in the country. A study based on total power output from plants fired with coal, petroleum, and natural gas shows that the total use of energy increased by 14.2% from 1967 to 1968 and by 12.6% from 1968 to 1969, while during the previous 10 years the average annual increase was only 6.6%. The largest users of energy in Dutch industry are chemical, metallurgical, and food processing plants. Details are given on the refining and use of petroleum products and the types of coal used in Dutch industry, and the steps followed in estimating SO2 emissions for the period 1963-1972.

CONTROL METHODS

12748 APTIC NO. 30159

THE DESIGN OF FLUID BED BOILERS. I. *Steam Heating Eng. (London), 40(472):6-12, March 1971. 1 ref.*

A discussion meeting on fluid bed boilers held recently was intended to provide the opportunity to review the state of fluid bed boiler technology, identify areas where work is required to solve immediate problems and where further research is necessary, and to discuss the potential offered by the development. In fluidized bed combustion, a bed of fine particulate inert solids is fluidized by air blown in from beneath. When the bed is heated and a fossil fuel injected, the fuel burns in the fluidized air and heat is rapidly transferred to all the solid particles in the bed. In a coal-burning system of this type, coal ash forms a suitable inert material for the bed. Among the advantages of the fluid bed system are reduced capital costs, excellent solid- gas contact, long solids residence time, and low operating temperatures. Recent experimental work indicates that the addition of limestone to the bed would result in 90% of the sulfur in coal being retained. This retention rate would meet U. S. requirements limiting sulfur dioxide in waste gases to 300 ppm. The main product of the reaction between sulfur and lime is CaSO4: the SO2 produced in the process of regenerating this to CaO could be recovered by processing to elementary sulfur or sulfuric acid.

12749 APTIC NO. 30192

GARBAGE COMPACTORS END AIR-POLLUTION PROBLEM. *Am. City, 86(6):28, June 1971.*

To comply with a new state air pollution law, six New Jersey apartment buildings have replaced incinerators with garbage compactors, installed beneath existing garbage chutes. The compactors operate automatically, first collecting garbage in hoppers and then feeding it to disposable bags placed on turntables. As the turntable rotates, a vertical ram compacts the garbage in the bag. The only manual operation is that of removing the filled bags and putting new ones in their place.

12750 APTIC NO. 30195

AIR CONDITIONER INDUSTRY ANSWERS TWELVE MEDICAL QUESTIONS. *(Klimaindustrie beantwortet 12 medizinische Fragen). Text in German. Sanit. Heizungstech., 36(5):418-419, 1971.*

The question on the composition of the air in an air conditioned room when the external atmosphere is polluted was answered by the air conditioning industry. The external air drawn in by the air conditioner is cleaned from pollutants such as dust, chemical waste gases, and odors. Air conditioners provide more hygienic and less harmful air than the atmospheric air. Through the selection of a proper place for the central air intake, the indoor air can be of a much better quality than the atmospheric air.

12751 APTIC NO. 30229

PURIFICATION OF WASTE GASES IN THE PAINT INDUSTRY. *(Avgasrening vid lackering). Text in Swedish. Koy, vol. 4:30-31, 1971.*

Waste gases from paint factories contain such impurities as lead, zinc, manganese, phosphorus, and large quantities of vaporized and cracked solvents. The most effective purification methods involve the oxidation of the waste gases, other methods, such as use of scrubbers, are not applicable. Two basic types of oxidation are used: catalytic and thermal. Catalytic afterburners operate in the temperature range of 250-400 C, depending on the composition of the gases. The most frequently used catalyst is a noble metal such as platinum, coated onto a ceramic base. For calculation purposes, one can assume an average lifetime for the catalyst of 14,000 hours. Approximately one liter of catalyst should be used for each 25 cu m/h gas flow, a figure that can vary depending on the composition of the gases. In cases where the use of a catalyst is undesirable, direct afterburning can be used; higher temperatures, in the range of 600-800 C, are required. It also is necessary for the waste gases to be maintained at such temperatures ofr a period of 0.4-10.0 sec. The catalytic process requires less initial investment in equipment than direct afterburning (about $4-5./cu m waste gas, compared with $5-6.) Operating costs follow a similar pattern, but accurate figures are not available.

12752 APTIC NO. 30260

ENVIRONMENTAL POLLUTION CONTROL INDUSTRY HANDBOOK-SPECIAL ISSUE FOR ENVIRONMENTAL POLLUTION CONTROL EXHIBITION 71. *(Kogaiboshi sangyo Yoran. 71 kogaiboshi sangyoten. Kankyo eisei kikiten tokushu). Text in Japanese. Japan Nippon Kogyo Shinbunsha and Kankyo Kogai Shinbun, March 1971. 128p.*

A list is compiled of companies manufacturing environmental pollution control devices. Companies manufacturing control devices exclusively for air pollution and odor are included. For each company, key personnel, plant locations and products are given, together with its agents. The remaining pages of the handbook are ddevoted to laws and regulations for environmental pollution control, government agencies, measurement methods, sulfur contents of oils imported by Japan, flue gas desulfurization methods, auto exhaust control, leasing and financing control devices, and books on environmental pollution. The list is exhaustive and the book is useful as a reference in choosing control devices for a specific problem in the field of environmental pollution control.

12753 APTIC NO. 30303

DEDUSTING PROBLEMS ON GRINDERS. *(Entstaubungsprobleme an Schleifmaschinen). Text in German. Metall, 24(4):367-370, April 1970. 3 refs.*

During the grinding process, dust is generated by abrasion both of the piece being ground and of the tool. It is imperative that this dust should be drawn off and removed from the air, since otherwise the permissible degree of air pollution in the working area would very quickly be exceeded, particularly in shops where in the cold season the air is being recirculated to economize in heating. The dust formed may be composed of particles of metal, wood, ceramics, and synthetic materials or rubber mixed with abrasive materials from the tool. The latter are hard, sharp-edged particles of mostly synthetic materials, such as corundum or carborundum and of binders. The dust concentration from grinding depends on the class of grinding, i.e., coarse, fine, or finest and on the material being ground. For instance, maximum dust formation has been observed in coarse grinding of ceramics up to a concentration of about 450 mg/cu m of air. The dust generated by a grinder can be contained to an appreciable degree by means of a suitably designed enclosure around the grinding wheel which, by an outlet nozzle, connects to an exhaust pipe. For best effects, the rate of suction should be arranged as a function of the grinding wheel diameter. For instance, about 700 cu m/hr are recommended for 250 mm wheel diameter, 1400 cu m/hr for 500 mm diameter, and 2200 cu m/hr for 750 mm diameter. For the actual removal of dust from the air, three main systems are generally in use. One is the group of centrifugal separators such as cyclones, effective up to 99% dust removal for particles above 5 micron size. The wet separators are essentially cyclones with the added feature of water sprays. The third group are the filters which can be used either on their own or in combination with centrifugal devices.

12754 APTIC NO. 30463

Ontario Research Foundation, Toronto

PROCESS FOR RECOVERY OF SULFUR FROM GAS EFFLUENTS. (DESCRIPTIVE NOTE ACCOMPANYING A REQUEST FOR PATENT). *(Procede de recuperation du soufre a partir d effluents gazeux de rebut. (Memoire Descriptif depose a l appui du une demande de Brevet d Invention.)) Brit. Pat. Appl. 1741/68. Jan. 11, 1968. (14 claims). Translated from French by the Agence Tunisienne de Public-Relations, Tunis (Tunisia), 30p, 1970.*

NTIS: TT 70-58029

A process for the separation of sulfur dioxide from waste gas effluents was described. The exhaust containing sulfur dioxide is contacted with a reducing gas containing hydrogen sulfide in the presence of a catalyst at 50-150 C. The sulfur dioxide is partially reduced to sulfur and is deposited on the catalyst. Sulfur is separated from the catalyst by reaction with carbon monoxide at 250-500 C. This regenerates the catalyst which is devoid of sulfur. The reaction between the carbon monoxide and sulfur produces carbonyl sulfide which is partially hydrolyzed to form a gas comprising hydrogen sulfide. The hydrogen sulfide is then recycled as the reducing gas.

12755 APTIC NO. 30791

REFUSE INCINERATING PLANT OF THE VOLKSWAGEN WORKS WOLFSBURG. *(Muellverbrennungsanlage im Volkswagenwerk Wolfsburg). Text in German. Wasser Luft Betrieb, 15(4):156-157, April 1971.*

An incineration plant is described which comprises a shaft furnace, the upper part of which is a rotary shell providing for a homogeneous distribution of the material to be burnt, while the lower part of this shell is connected with the combustion chamber. No moveable grate, which is usually the cause of many operating problems, is needed. The stoking necessary for proper combustion is accomplished by means of the rotating bottom of the combustion chamber. Through an opening in the bottom of the chamber, the liquid slag flows into a post combustion chamber. Flue gases are also extracted through this hole, then used for operating a hot water boiler. Oil sludges are introduced into the post-combustion chamber, raising the temperature to 1600 C, and thus causing a continuous flow of liquid slag into a cool water bath. Sudden cooling of the slag forms a fine granular material which can be used for sanitary land filling without distirbing the ground water. The flue gases pass through a filter and are emitted into the air by a 75 m high chimney. The dust content of the gases at the end of the chimney are 80-90 mg/cu Nm.

12756 APTIC NO. 30316

Atsukawa, Masumi, Kazumi Kamei, Naoharu Shimoda, and Tadami Eito

REMOVAL OF SO2 FROM FLUE GASES BY WET PROCESSES. *Text in Japanese. Mitsubishi Heavy Industries Ltd., Tech. Rev., 8(2):221- 233, March 1971.*

The lime-gypsum, ammonia sulfate, and sodium sulfate wet flue gas desulfurization processes are outlined, and their engineering aspects and economics considered. Also described are the results of a study on preventing the plume that accompanies a wet process. Pilot plant tests of the first two processes have been carried out at a power station, an oil refinery, and other plants. Currently, the lime-gypsum process is being successfully applied to remove sulfur dioxide from tail gases at a contact sulfuric acid plant. The process is designed to remove more than 90% SO2 from 62,500 N cu m/hr tail gas containing about 0.3% SO2 but no dust. Construction of a prototype lime-gypsum plant at a power station is scheduled for completion by the end of the year. The plant will treat 100,000 N cu m/hr of gases.

12757 APTIC NO. 30586

Atsukawa, Masami, Kazuo Matsumoto, Tooru Seto, Kyoichi Kokubo, and Hiroshi Momobe

DEVELOPMENT OF DAP-MN SYSTEM FOR FLUE GAS DESULFURIZATION. *Text in Japanese. Mitsubishi Juko Giho Mitsubishi Heavy Industries Ltd. Tech. Rev.), no. 8(2):234-238, March 1971. 10 refs.*

In one of Japan s national research and development programs, a prototype test plant for treating 150,000 std cu m/hr of flue gas was constructed at the Yokkaichi Power Station, Chubu Electric Power Co., at the end of 1967 and operated until the end of March 1970. The DAP-Mn method of desulfurizing flue gases was employed, and plant operations made it clear that the method can attain more than 90% desulfurization of flue gases containing 0.1 vol% sulfur dioxide. Ammonium sulfate of fine quality is obtained as a by-product. ON the basis of the pilot plant study, a semi-commerical plant is now under construction for treating 320,000 std cu m/hr -- about half the volume of flue gases emitted by the Yokkaichi No. 3 unit (220 MW). Dry processes for flue gas desulfurization are compared including catalytic oxidation, dry adsorption, and molten carbonate process. Also, the reaction rate, relationship between absorbent to gas, and over-all adsorbtion rate of this manganese oxide process is discussed. (Author abstract modified)

12758 APTIC NO. 30453

Badowska, Irena, Stanislaw Bretsznajder, and Wieslaw Kawecki

METHOD OF OXIDIZING SULFUR DIOXIDE IN AQUEOUS SOLUTIONS. *(Sposob utleniania dwutlenku siarki w roztoworach wodnych). Text in Polish. (Akad. Nauk, Warsaw (Poland), Inst. Chemii Fizycznej) Pol. Pat. 43,279. 2p., Aug. 30, 1969. (Appl. July 10, 1958, 1 claim).*

The innovative feature of the method described consists of suspending a catalyst in water through which sulfur dioxide gas is forced; the catalyst is a clay-like substance such as allophane, silica, limonite, hematite, kaolinite, montmorilonite, or dickite. This addition leads to a higher yield in the manufacture of sulfuric acid from sulfur dioxide gas.

12759 APTIC NO. 30590

Basshuysen, R. van and W. Hornfeck

EXHAUST GAS DECONTAMINATION OF THE RO 80 ROTATING COMBUSTION ENGINE BY THERMAL AFTERBURNING. *(Abgasentgiftung des Ro 80 Kreiskolbenmotors durch thermische Nachverbrennung). Text in German. Automobiltech. Z. (Stuttgart)., 73(6):218-222, June 1971. 7 refs.*

The control of the exhaust gases of the Ro 80 rotating combustion engine is discussed. Afterburning with catalysts and with a hot flame to oxidize gases in the exhaust pipe was infeasible, since catalysts were too short lived. Direct oxidation in the exhaust pipe became feasible with the introduction of the single exhaust pipe and pulse converter system. Previously, two exhaust pipes with a reactor were necessary to achieve the desired power. The new exhaust system requires a high temperature resistant pipe material to bear temperatures of 1150 C. A material, DEW ATS 200, composed of 75% nickel, 20% chromium, 4.5% iron, and 0.5% titanium is used. The air is injected by means of a cellule pump. Studies revealed that the air supply may not rise linearly with the rpm, since the hydrocarbon and carbon monoxide contents drop with increasing load and rpm. The air supply is regulated by the exhaust gas counterpressure and valve. Through thermal oxidation, the exhaust gases become cleaner than required by the California and Europe tests.

12760 APTIC NO. 30714

Bauerle, George L. and Ken Nobe

CATALYTIC AFTERBURNER DESIGN STUDIES. PART 1--STEADY STATE. *California Univ., Los Angeles, School of Engineering and Applied Science, Grant AP-00913, UCLA-ENG-7103, 56p., Jan. 1971. 20 refs.*

A graphical method for determining conversion and temperatures in an adiabatic catalytic afterburner for auto exhausts is presented. Close agreement between the graphical method and simultaneous numerical integration of the mass and energy balances was observed. The characteristic curves developed represent analytical integration of the balances assuming first order kinetics. A technique of extending the graphical treatment to non-first order reactions, by the use of a power law rate expression, is shown. A computer program was written to determine conversions and temperatures in catalytic converters operating under a wide variety of conditions. These conditions include isothermal and adiabatic operation with or without radial distribution of temperature or concentration and also operation with convective heat loss at the surface. It was found that, under normal automotive operating conditions, a valid first approximation for design purposes is an afterburner operating under adiabatic and plug flow conditions. (Author abstract)

12761 APTIC NO. 30717

Bauerle, George L., Gregg R. Service, and Ken Nobe

CATALYTIC REDUCTION OF NITRIC OXIDE WITH CARBON MONOXIDE. *Preprint, American Chemical Society, Washington, D. C., 5p., 1971. 3 refs. (Presented at the American Chemical Society, Meeting, Los Angeles, Calif., March-April 1971.)*

Heterogeneous catalytic reduction of nitric oxide in the presence of carbon monoxide was investigated. Reactions were conducted in a tubular pyrex reactor, fitted with eight thermowells spaced regularly at equal longitudinal increments. Immediately upstream of the reactor was a preheating chamber filled with pyrex beads and helices. Feed gases were mixed in a manifold equipped with micro-regulating valves and rotameters. Analyses were made using non-dispersive infrared instruments for determination of nitric oxide, carbon monoxide, and carbon dioxide. A flow colorimeter was used for determination of nitrogen dioxide. Gas chromatography was used for determination of oxygen, nitrogen, and nitrous oxide. Catalysts studied were copper-alumina, platinum-alumina, rhodium-alumina, ruthenium- alumina, copper chromate, copper-beta-spodumene, cerium oxide- alumina and sodium tunstate-alumina. Lead was also impregnated on copper oxide catalysts to determined its effect on catalytic activity. The catalysts showed a strong dependence of activity on the pretreatment technique. The presence of lead appeared to promote the CO-NO reaction.

12762 APTIC NO. 30261

Brand. H. D.

THE CATALYTIC COMBUSTION-STATE OF DEVELOPMENT AND THE POSSIBILITIES OF APPLICATION IN THE CHEMICAL INDUSTRY. *(Die katalytische Verbrennung-Entwicklungsstand und Moeglichkeiten ihrer Anwendung in der chemischen Industrie). Text in German. Chemiker Ztg. (Heidelberg), 95(10):458-460, 1971.*

Catalytic combustion is generally used for the elimination of gaseous or vaporous components of waste gases. Over the past few years the catalytic combustion method for air pollution control has been intensely developed. The most outstanding development is that of a ceramic honeycomb catalyst. The catalyst is a hexagonal prism with perforations in the direction of the axis. The carrier material of the catalyst is aluminum oxide with varying gamma fractions. Platinum metals are used as catalytically active substances. The catalyst compares favorably with all other types. Catalytic combustion can be used wherever hydrocarbons are to be removed from as flow of waste air. The residual gases from the air oxidation of paraffins and olefins (ethylene oxide, propylene oxide, acroleine), of aromatics (phthalic acid anhydride, maleic anhydride), and of alcohols can be cleaned by means of catalytic combustion. In a number of processes, the concentration of hydrocarbons is so high that the heat which is liberated by the catalytic combustion can be utilized.

12763 APTIC NO. 30450

Bretsznajder, S., W. Kawecki, W. Kotowska, and R. Gantz

EFFECT OF THE FOAM LAYER ON BUBBLE ABSORPTION OF GASES IN LIQUIDS. *(Udzial warstwy pianowej w procesie barbotazowej absorpcji gazow w cieczach). Text in Czech. Przemysl Chem., 35(12):564-565, 1956. 14 refs.*

The quantities of sulfur dioxide absorbed in a solution of aluminum sulfate were compared in the case where a layer of foam appears on the surface of the liquid and where the formation of foam has been prevented by introducing small quantities of diethyl ether. The role of the foam layer in the process of absorption can be of great importance; in some cases the quantities absorbed when foam was formed were 5-10 times higher than the quantities absorbed with diethyl ether present.

12764 APTIC NO. 30320

Brink, J. A., Jr., W. F. Burggrabe, and L. E. Greenwell

MIST ELIMINATORS FOR SULFURIC ACID PLANTS. *Chem. Eng. Progr., 64(11):82-86, Nov. 1968. 10 refs. (Presented at the American Institute of Chemical Engineers Workshop, Integrated Engineering Solutions to Overall Pollution Control: Air, Water, and Solid Waste Problems, Detroit, Mich., April 13-15, 1971.)*

Evidence of mist and spray in contact sulfuric acid plants ranges from the visible white plume leaving the absorbing tower exit stack to corrosion and drip acid resulting from entrainment into blowers, heat exchangers, and other equipment. With high efficiency fiber mist eliminators, completely invisible gaseous effluents are possible. These eliminators consist of fibers packed between two concentric screens. Mist particles collected on the surface of the fibers become a part of the liquid film which wets the fibers. The liquid drains down the inner screen to the bottom of the element and then to a liquid seal pot from which it flows continuously back to the process. Collection efficiencies on particles greater than three micron are essentially 100% while efficiencies as high as 99.98% are attainable with particles three micron and less. The operating characteristics of the high efficiency fiber mist eliminator are compared with those of the other two basic types: high velocity units and spray catchers. Criteria are given on which to base the selection of a specific type of fiber mist eliminator for new absorbing and drying tower installations.

12765 APTIC NO. 30312

Byers, R. Lee

ELECTROSTATIC PRECIPITATORS. *Preprint, American Inst. of Chemical Engineers, New York, 18p., 1971. 7 refs. (Presented at the American Institute of Chemical Engineers 0Workshop, Integrated Engineering Solution to Overall Pollution Control: Air, Water, and Solid Waste Problems, Detroit, Mich., April 13-15, 1971.)*

Despite nearly a half century of experience with electrostatic precipitation, theoretical design of a precipitator is almost impossible. The fundamentals of electrostatic precipitation are understood but theoretical efficiencies are never attained; prediction of performance is largely empirical. The precipitator is a useful device because of its low pressure drop and because it can operate at temperatures up to 1000 F. In general, precipitators have a high initial cost compared to other types of collectors, but over a period of years the lower pressure drop results in a savings of fan power which reduces the overall cost differential. Typical applications and operating variables of electrostatic precipitators in the metallurgical industry are illustrated. (Author introduction modified)

12766 APTIC NO. 30868

Calvert, Seymour

SOURCE CONTROL BY LIQUID SCRUBBING. *In: Air Pollution. Arthur C. Stern (ed.), Vol. 3, 2nd ed., New York, Academic Press, 1968, Chapt. 46, p. 457-496. 39 refs.*

Source control by liquid scrubbing involves the removal of contaminants in either the vapor or particulate state from an effluent gas stream. The transfer of contaminant requires contacting of the gas and liquid and their subsequent separation into cleaned gas and contaminated liquid streams. For particulate matter, material transfer between the gas and liquid phases may be by a variety of mechanisms; for gaseous molecules, it is basically by diffusion. The particulate collection mechanisms activate in scrubbers involve inertial, gravitational, electrostatic, thermal, and diffusional phenomena. Equilibrium considerations, contacting schemes, methods of contact, types of equipment, and capacity are reviewed for gas absorption. Mechanisms of particle collection are described, including packed beds, sprays, cross-flow, vertical countercurrent flow, and cocurrent flow. Power requirements and economics are discussed.

12767 APTIC NO. 30770

Caplan, Knowlton J.

SOURCE CONTROL BY CENTRIFUGAL FORCE AND GRAVITY. *In: Air Pollution. Arthur C. Stern (ed.), Vol. 3, 2nd ed., New York, Academic Press, 1968, Chapt. 43, p. 359-407. 27 refs.*

Particles suspended in a gas possess inertia, momentum, and are acted upon by gravity; these properties may be used to create centrifugal forces acting on the particle if the gas stream is forced to change direction. Centrifugal force is the primary mechanism of particle collection in cyclone separators and in most types of dust collection equipment loosely classed as inertial separators. Inertia of particles and centrifugal forces also play a part in filtration, scrubbing, and other methods of gas cleaning. The cyclone collector is widely used and cyclone theory is the basis for many inertial separator designs. Types of cyclones are indicated, as well as their operating mechanism, efficiency and pressure drop, erosion, fouling, and scope of use. Rotary stream dust separators, inertial separators, and gravity settling chambers are described.

12768 APTIC NO. 30278

Carvalho, Manoel Ricardo Da Costa, Mauro Pamplona Monteiro, and Miguel Borges

MEASURES FOR PREVENTING ATMOSPHERIC POLLUTION FROM CASTER BEAN DUSTS. *(Medidas para evitar a poluicao atmosferica por poieras contendo ricinina). Text in Portuguese. An. Fac. Med. Univ. Fed. Pernambuco, vols. 28-29:97-102, 1968-1969. 7 refs. (Presented at the Brazilian Congress on Hygiene, 17th, Salvador, Brazil, Dec. 8-14, 1968.)*

A high percentage of bronchial asthma was observed in people living near a caster bean processing factory. This was caused by the production and emission of dusts containing ricinin, a powerful allergen. The industrial process for extracting the oil is described and the phases in which the dusts are produced are mentioned. Several measures were suggested to avoid production of the dusts. These included: wetting the pomace with solvent before removing it from the extractor; total enclosure of the pomace transportation system; and packaging the pomace without previous grinding. These simple and economical modifications in the process control were found to be very useful. After they were adopted, the number of bronchial asthma cases decreased among people living in the vicinity of the factory. (Author summary modified)

12769 APTIC NO. 30584

Castelli, Gianmaria, Francesco Parrini, and Giorgio Sotgia

RESEARCH AND PROPOSAL FOR A MORE EFFECTIVE CORRELATION METHOD BETWEEN THE EFFICIENCY OF AN INDUSTRIAL ELECTROSTATIC PRECIPITATOR AND THE FLOW DISTRIBUTION IN IT. *(Ricerca e proposta di un metodo piu significativo di correlazione tra le caratteristiche del flusso in un precipitatore elettrostatico industriale e l efficacia dello stesso). Text in Italian. Termotecnica (Milan), 25(4):171-179, April 1971, 13 refs.*

A study was conducted to obtain a good flow distribution to improve the efficiency of electrostatic precipitators, usually used as fly ash collectors in coal-fired power stations. The different criteria adopted to give a quantitative evaluation of the degree of flow uniformity are examined. Calculations were conducted on a standard precipitator with plate-collecting electrodes, and the degree of approximation of the efficiency, according to the criteria, was estimated. The unfavorable results indicated the need for more significant criteria, through a theoretical or semiempirical approach. Due to the analytical complexity of the problem, the theoretical approach was not successful. The semiemipirical approach, however, resulted in a correlation method that is a qualitative improvement in comparison to the previous criteria. The approximation of the efficiency evaluation results improved at least one step in the order of magnitude. In this way, it was possible to find a sufficiently satisfactory correlation between the flow-uniformity parameters and the precipitator efficiency. (Author abstract modified)

12770 APTIC NO. 30744

Chertkov, B. A.

REMOVAL OF SO2 FROM FLUE GASES IN A PERFORATED-PLATE BUBBLE ABSORBER. *Khim. Prom. (Moscow), no. 5:413-417, 1959. 7 refs. Translated from Russian. Tennessee Valley Authority Technical Library, Muscle Shoals, Ala, 5p., May 16, 1968.*

NTIS: PB 196769T

Data are compiled on the effectiveness of sulfur dioxide absorption by an ammonium sulfite-bisulfite solution in a bubble tower with six perforated-plate gratings, in which a stable, foaming hydrodynamic regime is created. Under optimum conditions, the average coefficient of SO2 absorption in the installation is 21 kg SO2/cu m/hr/mm Hg. This is approximately 13 times higher than in a packed-column absorber. The percentage oxidation of the absorbed SO2 in the foam absorber is four to five times less than in a packed-column absorber under analogous conditions. These results indicate that the bubbler-tower absorber can be used on an industrial scale.

12771 APTIC NO. 30903

Cho, Tsurehide and Kato Tsutomu

MANUFACTURING METHOD OF CHEMICALS TO PREVENT AIR POLLUTION. *(Kuki osen boshizai no seizo hoho). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 46-20682. 4p., June 10, 1971. (Appl. Feb. 14, 1967, claims not given).*

An improved method of manufacturing a purifier for carbon monoxide in automobile engine exhaust gas was developed. Ten parts of fine natural zeolite powder, activated by immersion in diluted sulfuric acid, dried, and burnt is added to six or seven parts (in weight) of oxidized manganese powder, separated from hydrochloride acid, and three of four parts of fine oxidized copper powder, which has been separated from salt alkalic solution and dehydrated. The mixture is molded into pellets with a light press. The pellets are immersed in amino acid. Heat is generated by letting the solution hydrolyze naturally, and the organics contained in the solution are evaporated or burned. The net-like formation of alumina retained in the pellets adds to their mechanical strength. This method does not require special ultra high-pressure presses to mass produce pellets easily and precisely. The pellets perform as well or better than pellets made by former manufacturing methods. The pellets do not crumble while in use. They can be used to eliminate CO generated by oil stoves or with gas mask.

The pellets are active against CO oxidation at temperatures below 50 C.

12772 APTIC NO. 30186

Cohen, Seymour I., George Dorion, John R. Goldsmith, and Solbert Permutt

CARBON MONOXIDE UPTAKE BY INSPECTORS AT A UNITED STATES-MEXICO BORDER STATION. *Arch. Environ. Health, 22(1):47-54, Jan. 1971. 23 refs.*

Collection of expired-air carbon monoxide samples were used to examine employees at the United States-Mexico border inspection station to determine if there was a significant increase in carboxyhemoglobin levels in the course of the working day. Twenty- six border inspectors were categorized as to smoking habits and work shift CO exposures. Employees not actively engaged in car inspection duties constituted the control group. After shifts when particularly high ambient CO levels persisted, significant increases in COHb were noted in smokers and nonsmokers. Controls did not show significant alterations in COHb levels. The hazards of such COHb elevations to exposed persons are discussed in light of recent evidence of a lack of threshold for cardiovascular and central nervous system effects. Automatic transport systems for motor vehicles, such as those used in arc wash facilities, are recommended so that engines need not be kept running near the inspection station. Exhaust ventilation systems installed in the pavement rather than overhead would be more efficient in reducing ambient CO levels in the vicinity of the inspection employees. (Author abstract modified)

12773 APTIC NO. 30809

Courau, P. J.

THE ELIMINATION OF ODORS. *(L elimination des odeurs). Text in French. Cah. Med. Inter Profess., no. 41:61-69, 1971. 8 refs.*

Unpleasant odors are being released into the air in installations of various kinds, such as slaughter houses, dairies, breweries, distilleries, tanneries, oil refineries, coke oven batteries, and chemical and pharmaceutical plants. Odor is a volatile emanation which causes sensations in the human olfactory system. Methods of analysis of odors are mostly of a subjective nature. Odors are classified in relation to their quality, intensity, acceptability, and power of penetration. Odor quality is characterized by relating it to that of well known odorants, such as coffee, onions, and fruits. The intensity of odor is usually defined by one of four classes: absence of any odor, odor hardly perceptible, marked odor, and excessive odor. Acceptability signifies the agreeable or disagreeable character of an odor. In some cases an odor of a certain quality can be agreeable at low intensity, but disagreeable at higher concentrations. Power of penetration means the aptitude of an odor to spread in a substantial volume of air and be perceptible in it. Methods for eliminating odors can be summarized as follows: controlled circulation of air between a room with stronger odors and one without; Dilution of odors with outside air by ventilation; circulation of interior air through an installation for trapping odors by adsorption or absorption where active charcoal is widely used as an adsorbent; use of substances for masking or neutralizing odors; aspiration of odors directly at the source, and evacuation of the same to the open atmosphere; thermal or catalytic combustion; and ozonization.

12774 APTIC NO. 30633

Daintry, S. H. and B. R. Brown

THE COMBAT AGAINST ENVIRONMENTAL POLLUTION IN GREAT BRITAIN. *(Der Kampf gegen die Umweltverschmutzung in Grossbritannien). Text in German. Chem. Rundschau (Solothrun), 24(22):490, June 2, 1971.*

The combat against air pollution has been going on for a long time in England. Combustion of mineral coal was prohibited in 1273. Drastic measures were taken only with the Clean Air Act in 1956. The act permits the authorities to measure the dust and soot quantities coming from furnaces. It is not, however, directed against the most noxious of the pollutants, sulfur dioxide. Research in the field of air pollution is primarily financed by public means. Four organizations conduct research in this field: the Warren Spring Laboratories, the Medical Research Council, the Atomic Energy Research Establishment, and the Central Electricity Generating Board. Automatic measurements are being conducted at more than 1200 sites distributed all over the country. The concentration of automobile exhausts in the air is not considered high. Also, the lead contents in the air are not considered high. Also, the lead contents in the air are not considered dangerous. The average concentration of automobile exhausts in the city of London during a typical winter day is about 100 mg/cu m. Smoke development in London has decreased since 1956 by 75% annually. The visibility in winter improved from 2.4 km to more than 7.3 km. The SO2 concentration decreased by 38%. This was achieved mainly by the construction of higher stacks. Sun radiation has increased in the months from November to January by 50%.

12775 APTIC NO. 30836

Davis, R. J. and J. Truitt

THE FUNCTION OF CONDENSING STEAM IN AEROSOL SCRUBBERS. *Oak Ridge National Lab., Tenn., National Air Pollution Control Contract, AEC Contract W-7405-eng-26, Rept. ORNL-4654, 161p., March 1971. 41 refs.*

NTIS: ORNL-4654

Information is presented which would allow the design of a particle scrubber to efficiently and cheaply remove very fine (0.2-2 micron) particles from polluted air streams. The basic concept is to grow these fine particles up to a size which can be readily separated in a cyclone or other inertial device. The tiny particles would first be grown by steam condensation, then further grown by turbulent agglomeration. Experiments were done in a simple, vertical pipe, water cooled condenser into the bottom of which aerosol plus steam was fed. The aerosol concentration and particle size distributions were measured with and without steam addition for a variety of aerosols and steam condensation rates. These experiments demonstrated that growth does occur, even at low water vapor supersaturation, with a variety of particle substances (including hydrophobic, hydrophillic and hygroscopic substances), with a variety of particle sizes, concentrations, and steam condensation rates. Two simple models of patterns of growth by condensation are suggested which are consistent with the observed removal efficiency results; with hydrophobic particles, massive growth of a fraction of the particles occurrs, with hydrophillic and hydroscopic particles equal growth of all particles occurs. Experiments demonstrated that the removal efficiency of the condenser increased sharply with aerosol velocity and at very high particle number concentration; these qualitatively verified that growth subsequent to condensation can readily occur due to turbulent (or velocity gradient) agglomeration. Observed removal efficiencies were commonly greater than 90%; such efficiencies were observed with a steam consumption rate as low as 19 lbs per 1000 cu ft of aerosol which corresponds (assuming steam costs $0.25/1,000,000 Btu) to a cost of $0.0047/1000 cu ft of scrubbed aerosol. The results suggest that the concept is valid and should be pursued. (Author abstract modified)

12776 APTIC NO. 30168

Domin, G.

STUDY OF THE CATALYTIC OXIDATION OF MULTISUBSTANCE MIXTURES. *(Zur katalytischen Oxidation von Mehrstoffgemischen). Text in German. Chem. Ing. Tech., 43(8):497-505, April 1971. 23 refs.*

The catalytic oxidation of multicomponent waste gases (hydrocarbons) was studied. The reaction constants, enthalpy, and temperature distribution in the catalyst can be calculated by the reduction of the multi-component mixture to one single quasi-gas component. It was assumed that the chemical reactions in the reactor are heterogeneous, the speed of hydrocarbon and hydrogen oxidation depends only on the concentration of the original substances, and the reaction products exert no influence on the reaction process. Also, it was assumed that all the reactions studied were complete, the chemical reaction was of first order, and the reactions were carried out adiabatically. The mathematically obtained results were compared with the results of tests in an experimental reactor. The reactor (with a diameter of 300 mm) was filled with three layers of catalyst, each layer 115 mm high. Air was preheated to the reaction temperature, then mixed with the gas to be examined. The adiabatic temperature increase was measured. In some cases, the concentration change was determined through chemical analysis. These experiments and experiments in a large scale reactor (diameter equal to 4 m) agreed satisfactorily with the calculated results.

12777 APTIC NO. 30470

Drehmel, D. C.

TESTS TO EVALUATE OVERBURNING OF LIMESTONE. *Preprint, Air Pollution Control Office, Cincinnati, Ohio, Process Research Section, 11p., 1971 (?). 11 refs.*

The dry limestone injection process for control of sulfur oxides emissions was evaluated in a full-scale demonstration of performance. If the injected limestone calcines at very high temperatures, a less reactive lime results, and sulfur dioxide removal efficiency declines. This loss of reactivity, known as deadburning, may be measured by several standard techniques if the test sample is strictly lime. However, evaluation of the dry limestone injection process requires measurements of deadburning on partially sulfated test samples of limited size diluted with fly ash. The results of chemical and physical property tests of three series of calcined carbonate rocks (two limestones and one dolomite) were reported. Several tests were selected for a study of the effects of test parameter, partial sulfation, and dilution with fly ash. Three reactivity tests sulfur dioxide absorption, carbon dioxide absorption, and hydration-weight gain were suitable as field tests for deadburning on samples of limited size diluted with fly ash. One of these, the hydration weight gain test, is recommended because it is independent of the degree of sulfation. (Author abstract modified)

12778 APTIC NO. 30578

Erdlen, Ferdinand

SMOKE AND DUST DEVELOPMENT IN A FERROALLOYING PLANT. *(Rauchund Staubentwicklung in einem Ferrolegierungswerk). Text in German. Neue Huette, 16(5):261-265, May 1971. 5 refs.*

Ferromanganese production, in a plant which was originally designed for some other process emits large amounts of dust. To improve this condition, exhaust hoods were installed at the electric arc furnaces which produce the ferromanganese carbure. Furthermore, discontinuous operation was changed to continuous operation, and the method of slag treatment was changed to water granulation. Measurements at the individual furnaces showed that an average of 12,500 kg dust/day is emitted by all four furnaces. The manganese content of these dusts is about 33%. A large quantity of the manganese contained in the flue gases escapes in vaporous form. Through the installation of the exhaust hoods, all waste gas is now forced to leave by the stack. Efficient dust collection is achieved by means of cyclones. It is hoped that the dust emission can be reduced to 0.6 g/cu m. It is estimated that the investment costs will amount to $420,000. It is expected that $53,000 are gained each year through the recovery of the collected dusts.

12779 APTIC NO. 30208

Estridge, R. B., B. G. Turner, R. L. Smathers, and L. J. Thibodeaux

TREATMENT OF SELECTED KRAFT MILL WASTES IN A COOLING TOWER. *TAPPI, 54(1):53-59, Jan. 1971. 10 refs. (Presented at the Association of the Pulp and Paper Industry, Waste and Air Conference, Minneapolis, Minn., June 7-10, 1970.)*

Pulp mill condensates and decker filtrate from an 850-ton/day kraft linerboard mill have been successfully treated in a conventional cooling tower. These waste streams, in combination with the condenser waters from a barometric type evaporator condenser, are cooled in the tower and reused. The overall accomplishment of this process is the removal of about 10,000 lb of Biochemical Oxygen Demand (BOD) per day and the reduction in overall mill water needs of about 1,000,000 gal/day. Treatment efficiencies of 65-85% for pulp mill condensates and about 40-50% for combinations of decker filtrate and pulp mill condensates were obtained. The reduction in BOD of these waste streams is believed to be due primarily to the stripping of methanol and other volatiles. Some biological activity is evident, however, and the addition of nutrients results in an improvement of five to 10% in BOD removal. The system has several advantages over the conventional surface condenser system used with kraft mill evaporators. Both operating and capital costs compare favorably with other waste-treatment methods. (Author abstract)

12780 APTIC NO. 30380

Ferraiolo, Giuseppe, Adriano Reverberi, Artono Peloso, and Giusepp Fumarola

CHEMICAL PLANTS ENGINEERING AND AIR POLLUTION. *(Impiantistics chimica e inguinamento atmosferico). Text in Italian. Quad. Ing. Chim. Ital. 7(1):13-17, Jan. 1971. 13 refs. (Presented at the Conference on Chemistry and the Environment, Bari, Italy, Oct. 9-12, 1970.*

The principles of plant engineering, applied to environmental problems, are expounded and illustrated with practical examples. Air pollution control is effected in three areas of concern, each of these dependent on the preceding: the study of the effects of pollutants on living organisms; the study of the mechanisms by which pollutants are distributed and dispersed in the atmosphere; the development of techniques to eliminate or reduce pollution phenomena to a level that can be tolerated. In designing new manufacturing plants, there is a tendency to treat separately the problems of reducing emissions and dispersal of waste gases, whereas these two areas of concern are interrelated and need to be treated as such. Two pilot investigations are described, one involving the construction of a plant in a coastal area surrounded by hills, the other in the flat, heavily industrialized Poe Valley of Northern Italy. Investigations are made of other polluting industries already located in the area, the type of pollutant that will be emitted by the new plant, wind conditions, and meteorological factors. Emphasis is placed on the employment of both stationary and mobile measurement sites for determining ground level concentrations of pollution in the vicinity of the proposed plant site. Stress is also laid on the importance of economic factors. The planning of purification plants and dispersal equipment must be handled with care and precision, in order to insure effective control while keeping its costs within feasible limits.

12781 APTIC NO. 30449

First, Melvin W.

PROCESS AND SYSTEM CONTROL. *In: Air Pollution. Arthur C. Stern (ed.), Vol. 3, 2nd ed., New York, Academic Press, 1968, Chapt. 41, p. 291-318. 16 refs.*

Reduction of air-pollutiong emissions by process and system control is an important adjunct to air and gas cleaning technology and to atmospheric dispersion, as well as an important technique when it can be used as the only control measure. Offensive substances often may be eliminated entirely from processes which are causing air pollution by substituting materials which perform equally well in the process but which discharge innocuous products to the atmosphere or none at all. Process changes can be as effective as product substitution in eliminating air pollution emissions. Good building construction, plant layout, and housekeeping are discussed. Sources of contaminants, the effect of contaminant concentration on atmospheric dispersion, principles of local exhaust hood design, and exhaust system piping are considered. The utilization of untapped air resources by such methods as the staggering of work hours is also discussed.

12782 APTIC NO. 30660

Freudenthal, Peter

HIGH COLLECTION EFFICIENCY OF THE AEROTEC-3 CYCLONE FOR SUBMICRON PARTICLES. *Atmos. Environ., 5(3):151-154, March 1971. 5 refs.*

The Aerotec-3 cyclone, a widely used instrument for the removal of coarse particulates from airstreams, was calibrated with micron and submicron diameter aerosols. The calibration procedure used is described. Because of technical difficulties, no tests could be made for particles between 0.292 and 0.929 millimicron. However, reasonable estimations of efficiencies for these intermediate size particles were made. The Aerotec-3 is 50% efficient for 0.6 millimicron density particles. The higher efficiency of the Aerotec-3 is probably due to several factors, including a new design and a radially, rather than tangentially, mounted inlet port. Also, the polydispersed, irregularly shaped mineral dusts used in earlier calibrations are difficult to size. It is concluded that this cyclone is much more efficient than previously supposed. (Author abstract modified)

12783 APTIC NO. 30405

Fukuma, Shinichi

THERMAL GENERATION INDUSTRY AND POLLUTIONS. *(Karyoku hatsuden jigyo to kogai). Text in Japanese. Nippon Kikai Gakkaishi (J. Japan Soc. Mech. Engr., Tokyo), vol. 74(626):257-259, March 1971.*

Although hydraulic generation was predominant in prewar Japan, thermal generation is now the mainstay, consuming about 40% of heavy oil. Large quantities of sulfur dioxide are emitted by the electric power industry, but the industry is making every effort to develop pollution countermeasures. Among the countermeasures under consideration are use of low-sulfur oil, use of liquefied natural gas, combustion of crude oil, dilution by tall stacks, and desulfurization of smoke. The first method is very difficult since 70% of the oil used by the Japanese oil industry is imported from the Middle East and contains more than 2% sulfur. Even though low-sulfur oil may be developed in southeast Asia, Africa, and Alaska, its additional cost (30% higher) will be a disadvantage. Liquefied natural gas cannot be depended on entirely; its use represents a transient measure until desulfurization techniques for urban thermal stations are perfected. Combustion of crude oil would adversely affect the oil refining industry and also requires naptha; however, with the understanding of the government and refineries, this method is also being used as a temporary measure. A 120 cm stack was first used by the Chubou Power Company, at Yokkaichi. The highest stack (200 m) is now that of the Tokyo Power Company at its Anegasaki Station. This cannot be considered a final solution. No satisfactory methods of desulfurizing smoke have yet been devised. Wet methods, in contrast to dry methods, are simpler, easier to operate, and have lower construction and operating costs. But gases treated by wet methods do not diffuse as widely as those treated by dry methods, since the gases are cooled to 60 C and their humidity increased. With dry methods, exhaust gas temperatures are over 110 C. Consequently, power plants are adopting dry methods such as activated coal and activated charcoal.

12784 APTIC NO. 30772

Garrett, C. H.

ACCURATE INCINERATION CONTROL: AN INTERESTING AND IMPORTANT ENGINEERING CHALLENGE. *American Society of Mechanical Engineers, New York, Incinerator Div., Proc. Natl. Incinerator Conf., Cincinnati, Ohio, 1970, p. 40-46, 128-140. (May 17-20.)*

To assure efficient and smokeless operation, modern incineration plants must be equipped with adequate instrumentation for monitoring and control. A number of control systems are reviewed to demonstrate the technology available and where additional development is necessary. The systems apply to combustion and stoker control, oxygen and moisture measurements, air flow maintenance, over fire air, furnace draft control, regulation of tempering air, spray chamber control, boiler control, and board-mounted instrumentation requirements. The basic design of each system will be dictated by the operational requirements of low particulate emission and efficient volume reduction. Other factors influencing design decisions are refuse consist, sizing, plant location, storage facilities, duty cycle, and maintenance requirements.

12785 APTIC NO. 30597

Golubtsov, V. A., M. S. Rezyapov, and B. S. Belosel skiy

UTILIZATION OF SULFUR-BEARING MAZUT IN ENERGY PRODUCTION AND PROSPECTS OF OB-

TAINING LOW-SULFUR FUEL MAZUT. *(Ispolzoaniye sernistykh mazutov v energetike i perspektivy polucheniya malosernistogo topochnogo mazuta). Text in Russian. Elektr. St. (Moscow), 42(4):11-13, April 1971.*

The problem of the presence of sulfur in mazut used as fuel in electric power plants is considered. Two solutions are discussed in detail: purification of flue gases of electric power plants from SO2, and removal of sulfur from mazut prior to its use as fuel. The latter can be accomplished by thermal processing of mazut, either mazut gasification of mazut pyrolysis. The methods of production of liquid fuel of low sulfur content in crude oil processing plants are discussed. The economic considerations are taken into account.

12786 APTIC NO. 30212

Goto, Kaneo

MULTI-CYCLONE DUST COLLECTOR. *(Maruchisaikuron shujinki). Text in Japanese. (Hitachi Seisakusho K. K. (Japan)) Japan. Pat. Sho 46-12456. 2p., April 30, 1971. (Appl. March 11, 1968, claims not given).*

The construction, or assembly process, of a multi-cyclone dust collector is described. The assembly process has been devised to make construction of the dust collector easier. Under the conventional assembly method for its construction, the multi cyclone unit usually consists of nine to 16 cyclones. Each cyclone is separated into two parts, the upper half (the inner tube) and the lower half (the outer tube). Since both the inner and outer tubes are mounted in a few rows on separate boards, and the aperture of the outer tube is only slightly larger than that of the inner tube, it is quite difficult to coincide the inner tube with the outer tube for the assembly. This difficulty can be rectified with the new assembly process. Each row of the inner or outer tubes is mounted on an oblong plate whose side edges are bent upward like a trough. Both ends of the plate are bent downward. The first row of outer tubes is fitted in place in the interior of the multi-cyclone casing by welding both ends of the plate to the side of the trough-like frame attached to the inner wall of the casing. The counterpart of the inner tubes is aligned, coincided with the first row block of outer tubes, and welded to the casing in a similar manner. The second row of outer tubes is then placed alongside of the first row and attached to the first row by welding their bent side edges to each other. The second row of inner tubes are aligned with the second row of outer tubes and welded to each other in the similar manner. This process applies to the third, fourth rows and subsequent rows.

12787 APTIC NO. 30337

Gubatz, Fritz

WASTE PRODUCTS TYPICAL FOR POWER PLANTS, SECONDARY RAW MATERIAL, RECOVERY OF VALUABLE MATERIAL, AND THEIR SOCIO-ECONOMIC UTILIZATION. PART I. *(Kraftwerkstypische Abprodukte, Sekundaerrohstoffe, Wertstoffgewinnung und deren volkswirtschaftliche Nutzungsmoeglichkeiten - I. Teil --). Text in German. Energie Tech., 21(5):213-216, May 1971. 17 refs.*

A 350-ton/hr steam boiler generates roughly 600,000 cu m/h of waste gas. The gas contains sulfur and carbon dioxide. Fly ash containing aluminum and silicon is a valuable waste product which is traded in the U. S. at a price of $80/ton. The quantity of flue gas heat for a 100-MW complex (temperature interval 200 to 20 C) is 36 by 10 to the sixth power kcal/hr. A temperature difference of 30 C could be utilized. It would yield a waste heat quantity of 6 Gcal/hr. The possibilities of waste heat re utilization are being studied.

12788 APTIC NO. 30293

Haeberle, Manfred

MAINTENANCE OF CLEAN AIR IN THE CHEMICAL INDUSTRY: A SURVEY OF WASTE GAS/WASTE AIR CLEANING METHODS WITH RESULTS FROM THE BASF AG. *(Luftreinhaltung in der chemischen Industrie: eine Uebersicht ueber Abgas/Abluft-Reinigungsverfahren mit Ergebnissen der BASF AG). Text in German. Chemiker Ztg. (Heidelberg), 95(10):438-449, 1971. 16 refs.*

Pollutants emitted by the chemical industry and control methods used are surveyed. The influence of an emission on man, that is, on the emission, lessens with increasing height above-ground. The contribution of an emission to the concentration of the pollutant at breathing height is reciprocally proportional to the height of the emission discharge. Under normal weather conditions, the emissions contribute less to the emission concentration; during inversions, they contribute more. The pollutants may be gases, vapors, aerosols, and dusts. Dusts have diameters from less than 10 to more than 50 micron. Aerosols are liquid or solid particles with diameters from 0.001 m to 1 micron. The individual molecules of gases and vapors range from 0.0001 to 0.001 micron. Dusts and aerosols are removed by sedimentation chambers, cyclones, packed towers, cloth filters, electrostatic precipitators, and wet collectors. Selection of one of these methods depends on average grain size, grain size distribution, quantity to be cleaned, acceptable pressure loss, and on investment and operating costs. Efficiency, pressure loss, and rough estimates of operating and investment costs are given for each method. Gases and odors are removed by absorption, adsorption, and thermal combustion. Examples are presented to demonstrate the success of adequate waste air cleaning. Process changes and a changeover from coal to petroleum and natural gas were instrumental in obtaining absolute reductions of emissions by the Badischen Anilin and Soda Fabrik.

12789 APTIC NO. 30790

Hakono, Tometora

METHOD OF NEUTRALIZING CLEANING WATER OF WET TYPE DUST COLLECTING EQUIPMENT FOR SEWAGE SLUDGE INCINERATOR. *(Gesui odei shokyaku sochi no shishiki shujin sochi no senjosui o chuwa suru hoho). Text in Japanese. (Tsukishima Machine K. K. (Japan)) Japan. Pat. Sho 46-18909. 2p., May 26, 1971. (Appl. Feb. 22, 1968, 1 claim).*

A method of neutralizing the scrubbing water from the wet type dust collecting apparatus of sludge incineration equipment is described. The system comprises a vacuum dehydrator, the incinerator, and the dust collection equipment. It is customary to separate the solids from the liquids at sewage disposal plants. The liquids are cleaned by aeration, sterilized with chlorine, then discharged. The solids are condensed to contain approximately 95% water, then dehydrated with a vacuum filter to about 70% water. Generation of chlorine and hydrochloric acid during incineration turns the cleaning water acidic, and the addition of an alkaline solution is needed to prevent the dust collection equipment from corroding.

12790 APTIC NO. 30381

Hardison, L. C.

WET CLEANING OF PARTICULATES. *Am. Ceram. Soc. Bull., 49(11): 978-982, Nov. 1970. 6 refs. (Presented at the American Ceramic Society, Annual Meeting, 71st, Washington, D. C., May 6, 1969.)*

Wet scrubbing for particulate collection depends principally upon inertial impaction as the collection mechanism. Various scrubber designs have been used for particles significantly larger than 1 micron with good results, but high efficiencies for submicron particulates require high gas velocities and dispersion of the liquid collecting phase into very small droplets. The venturi scrubber has been used almost exclusively for treating submicron particulate collection problems. The application of venturi scrubbers to gas streams containing significant amounts of submicron-sized material is complicated by the problems inherent in sampling and separating the fine particulates. The use of field pilot units or substantial overdesign of commercial equipment have been the principal approaches to the use of venturi scrubbers on new applications. The submicron particle classifier, used as a sampling instrument, can provide the information necessary for the design of commercial scrubbing equipment without direct measurement of the particle size and distribution. Commercial venturi scrubbers provide good solutions to most of the submicron particulate handling problems occurring in air pollution work. A good design will provide for flexible operation over a wide range of gas flows, good energy recovery after the high velocity throat, and complete separation of the scrubbing liquid from the gas stream in addition to high collection efficiencies. (Author conclusions)

12791 APTIC NO. 30787

Hashida, Isao and Masato Nishimura

FINE STRUCTURE OF AMINOPHENOL CONDENSATE RESIN AND ADSORPTION OF SULFUR DIOXIDE - ADSORPTION OF GAS BY ION EXCHANGER, FOURTH REPORT. *(Aminofernoru shukugo jushi no bisai kozo to nisanka iwo no kyuchaku - Ion kokantai ni yoru kitai no kyuchaku, dai 4-po). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, 1p., 1971. (Presented at the Japan Chemical Society, Annual Meeting, 24th, Tokyo, March 1971, Paper 3412.)*

Using a scanning electron microscope, a mercury porosimeter, and a BET surface-area measuring device, the fine structure of porous resin obtained by condensing meta-aminophenol and Formalin under coexistence of polyethylene glycol (PEG) and sodium chloride was measured together with its adsorptivity of sulfur dioxide. Polyethylene glycols with molecular weight from 400 to 4000 were used. The resin produced with addition of PEG only was not porous. It became porous when both PEG and sodium chloride were present. The relationship between the fine structure of the resin and molecular weight of the PEG when the resin was manufactured through condensation of meta aminophenol in the presence of both PEG 60g and NaCl 39g was studied. With an increase in molecular weight of PEG, the surface area decreased, the pores formed became larger in diameter, and the resin tended to become more fragile. The interior of the resin consisted of extremely fine spherical or bead-shaped grains linked with one another in three dimensional directions. It was also observed that continuous pores were formed between the grains. Based on gas chromatographic estimations of sulfur dioxide with an accuracy error within plus or minus three percent, a linear relationship exists between the full peak and the density (less than two percent). The dynamic adsorptivity for respective types of the resin in R-OH was also measured.

12792 APTIC NO. 30614

Hashimoto, Ichizo

PRESENT SITUATION AND COUNTER PLAN FOR AIR POLLUTION AT OSAKA PREFECTURE. *(Osakafu ni okeru taiki osen no genjo to taisaku). Text in Japanese. Ryusan (J. Sulphuric Acid Assoc.) (Japan), 24(3):85-93, March 1971.*

Osaka has thousands of industrial plants, contains over one million motor vehicles, and has a population of over seven million. The city is one of the most over populated in the world. It is an important commercial, financial, and industrial center. However, air pollution is now a social problem at Osaka due to the recent trend of a production-comes-first policy, the backwardness of consolidation of social capital for the field of life, and the inadequacy of city planning, housing measures, and industry location measures. The present situation of air pollution at Osaka and the countermeasures being put into practice are described and discussed after outlining the historical and meteorological background of air pollution at Osaka. Air pollution at Osaka has a long history and various types of countermeasures have been taken by administrators. However, in recent years, air pollution at Osaka has increased with increasing industry and use of motor vehicles. The major pollutants at Osaka are sulfur oxides, soot, aerosols, and motor vehicle emissions. As it is difficult to meet the environmental standards by lawful regulations alone, a program called the Blue Sky Program is now being used as a systematic approach to air pollution control. As a countermeasure against motor vehicle emissions, the so-called idle adjustment is being pursued.

12793 APTIC NO. 30402

Hayami, Fumihiko and Tadao Yamaoka

DUST COLLECTOR. *(Shujin sochi). Text in Japanese. (Hitachi Seisakusho K. K. (Japan)) Japan. Pat. Sho 46-12455. 2p., April 30, 1971. (Appl. March 11, 1968, claims not given).*

A dust collector, consisting of a multi-cyclone, an electric dust collector, and an auxiliary cyclone is described. The collector is used for the gas extracted from the hopper of the multi-cyclone unit. The auxiliary cyclone is so designed that dust, separated from the extracted gas by the auxiliary cyclone, may be sucked into the hopper of the electric dust collector; the gas cleaned by the auxiliary cyclone is sucked into the entrance of the electric dust collector. This is accomplished by the pressure difference between the multi-cyclone and the electric dust collector. In the multi-cyclone/electric dust collector combination, a part of the gas flow is extracted from the hopper of the multi-cyclone unit to improve its dust removal efficiency. An auxiliary blower is generally used for this purpose. With this collector, the extra blower is not necessary since the extraction is made by taking advantage of the pressure difference between the multi-cyclone and the electric dust collector. This difference is caused by the main blower, provided in the discharge flue of the electric dust collector. Dust, separated from the extracted gas by the auxiliary cyclone, is sucked into the electric dust collector s hopper and, when cleaned, is sucked into the upper section of the electric dust collector by means of the pressure difference.

12794 APTIC NO. 30773

Heschele, C. A.

ULTIMATE DISPOSAL OF INDUSTRIAL WASTES. *American Society of Mechanical Engineers, New York, Incinerator Div., Proc. Natl. Incinerator Conf., Cincinnati, Ohio, 1970, p. 73-77, 235-243. (May 17-20.)*

A description is presented of a new disposal facility designed to chemically treat and/or to incinerate, without pollution, industrial wastes received from process industries within a regional area. Noncombustible liquid wastes will be chemically treated to render them inoffensive and nonpolluting. The clean effluent will be returned to nature, and the solids will be used for land reclamation. Combustible liquids and combustible solids will be incinerated in a Loddby furnace and rotary incinerator, respectively. Both furnaces are noted for high-temperature, turbulent, and efficient combustion. Discharge gases from each furnace enter a common afterburner, where the combustion of unburned particles is completed before entering a common gas scrubber. A gas-impingement scrubber has been selected to neutralize acids, remove particulates, and to cool the flue gases. The ash resulting from incineration will also be used for land reclamation. (Author abstract modified)

12795 APTIC NO. 30209

Hirano, Takao and Yoshihiro Suzuki

CATALYST TYPE EXHAUST GAS CLEANER FOR INTERNAL COMBUSTION ENGINE. *(Nainenkikan yo shokubai shiki haikigasu jokasochi). Text in Japanese. (Nippon Denso Kabushiki, Kaisha Kariya Shi (Japan)) Japan. Pat. Sho 46-11927. 5p., April 24, 1971. 2 refs. (Appl. May 28, 1965, claims not given).*

An automotive exhaust gas cleaner is described which features a tubular porous ceramic filter unit equipped with a thermal expansion/shock absorber. The conventional ceramic ball, or pellet, used as the carrier of a catalyst, is likely to become deteriorated due to the exhaust gas heat and the heat produced by the reaction of combustible gas with the catalyst. The new tubular porous ceramic filter, made of silica carbide or electric corundum, is highly heat-resistant up to 1000-1600 C. Superb in heat transfer characteristics, its temperature rise is comparatively low. The catalyst may be made of one or more of the following elements: copper, silver, gold, molybdenum, tungsten, manganese, iron, cobalt, nickel, and platinum. The cleaner is connected to the exhaust pipe as is the muffler; its main casing is tubular and larger in diameter than the exhaust pipe. The rear side of the cleaner has a rear holder frame which has outlet ports to discharge the filtered exhaust gas. The filter is held, mounted in a horizontal position, by this rear holder and the horizontal center rod. The front holder frame holds the front end of the filter in place. Outside of the front holder is a spring unit that serves as the thermal expansion/shock absorber. The center rod runs from the rear holder frame through the front holder frame and the spring unit to the cover plate of the spring unit, and is fixed in place by nuts provided at both ends. The spring unit is housed by a conical capsule. As the exhaust gas is taken into the cleaner, it flows into the tubular porous filter, where it is filtered and cleaned by the filter and catalyst. The filtered gas is then discharged through the outlets provided in the rear holder frame. When the tubular filter expands with heat or is shaken with shocks, the spring unit absorbs the expansion and shocks to protect the filter. Connection of the cleaner to the exhaust pipe may be made in the opposite direction, if so, the exhaust gas is first taken into the interior of the filter and flows through the filter outward. Two or more of the filters may be connected in series for a more thorough filtering and cleaning.

12796 APTIC NO. 30393

Hockel, M. L.

INFLUENCE ON QUIETNESS OF OPERATION OF THE COMBUSTION PROCESS IN HIGH SPEED DIESEL ENGINES, AND THE POSSIBILITY OF USING VARIOUS FUELS. *(Influenza del procedimento di combustione nei motori Diesel veloci sulla silenziosita e sulla possibilita di utilizzare combustibili diversi). Text in Italian. Lo Smog (Italy), p. 19-25, 1969.*

It is predicted that further developments in the diesel engine will be toward the development of an engine that can use a wider variety of fuels with indifference. The use of a preliminary combustion chamber instead of the standard direct-injection engine makes possible a more complete combustion of the fuel and quieter operation. The basic problem involved in adjusting engine operation to a variety of fuels is the difference in the time of induction, that is, the time lapse during which the fuel decomposes into intermediate products, prior to its direct reaction with the oxygen of the atmosphere. The combustion characteristics of three air-cooled diesel engines are compared, one of the turbulence-chamber type, one of the direct-injection type, and one with an equal-pressure preliminary- combustion chamber. For an equivalent mechanical power output, the precombustion chamber model burns less fuel than the direct injection motor, while the turbulence-chamber engine burns a larger quantity of fuel. At this same power output rating, the exhaust of the precombustion engine had a smoke level of about 32% measured on a Saurer-Bosch apparatus at 2000 rpm. Comparative measurements were made with the three engine types, using standard diesel fuel and Mogaz 80/86, the latter having an octane rating of 86 and acetane rating of 15. The noisiness of the motor is related directly to the ignition pressure, which is 80 kg/sq cm for diesel fuel and more than 100 kg for Mogaz. The turbulence chamber engine has the best performance characteristics under these changing conditions. When starting the engines at low temperatures, it is best to equip the precombustion and turbulence engine with a preheating spark plug. Without the auxiliary starting device, the motor can be started at temperatures as low as 15 C below zero, while with the device it is possible to start the engine at 25 C below zero, even if straight gasoline is used as fuel.

12797 APTIC NO. 30588

Hoehle, Leonhard

THE USE OF DISINTEGRATORS FOR DUST COLLECTION IN CUPOLA FURNACES. *(Einsatz von Desintegratoren zur Kupolofenentstaubung). Text in German. Giesserei (Duesseldorf), 58(12):357-362, June 17, 1971. 5 refs.*

The dust emission by cupola furnaces has been limited to a maximum level of 1.5 kg/ton of iron. In exceptional cases, a short-term emission of 2 kg/ton of iron is permitted. Electrostatic precipitators, tubular cloth filters, and venturi scrubbers are best suited for dust collection. Recently, the so-called disintegrator scrubber has come into use. In the disintegrator, rotary shaft carries the atomizing cones for the scrubbing water and the impaction cages. The scrubbing water is atomized and distributed over the cages. A close contact between the water and dust particles is achieved through impaction of the dust particles on the cage bars. These bars are made of steel and have a diameter of 15 to 20 mm. The disintegrator is corrosion resistant and very reliable. The disintegrator for a cupola furnace in a steel plant, which has been in operation since 1965, is still operating efficiently.

12798 APTIC NO. 30403

Honda, Soichiro

INTRA-ROOM ELECTRIC DUST-COLLECTING ELECTRODE DEVICE FOR TREATMENT ROOM. *(Shorishitsunai no shujin denkyoku sochi). Text in Japanese. (Honda Gijutsu Kenkyusho K. K. (Japan)) Japan. Pat. Sho 46-11032. 2p., April 16, 1971. (Appl. June 15, 1967, claims not given).*

When a painted product is being dried in a drying room, mists or aerosols of various kinds become suspended in the room as the paint solvent evaporates. The suspended aerosol adheres to other painted products being dried in the room, adversely affecting their finish. The dust-collecting electrode device is designed to remove such suspended aerosols or mists. The lower inner side walls of the drying room are lined with a grounded-dust- collecting plate. An electric collector bar is fitted to one inner side wall by means of arm rods which are fixed on the inner side wall by insulators. A conveyor runs along the ceiling of the room. Suspended from the conveyor are a number of hangers made of conductive material, but insulated from the conveyor. Each hanger holds a painted item. These hangers are so installed that they may come in touch with the collector bar and slide along the bar. The collector bar is connected to a negative high-voltage DC generator. The painted items are conveyed from a painting room provided before the drying room. The painting room is of an electrostatic painting system and equipped with a similar grounded collector bar. The paint sprays or atomizers, installed opposite to the collector bar in the painting room, are connected to a positive high-voltage DC generator. With this arrangement, the mist or aerosol is negatively charged in the drying room so that it may be adsorbed by the positive dust-collecting electrode plate.

12799 APTIC NO. 30357

Hori, Sanshi

DUST-REMOVING DEVICE FOR AIR FILTER OF AIR CONDITIONER. *(Kuki chowaki ni okeru eya firuta no jojinki). Text in Japanese. (Sanshi Hori, Japan), Japan. Pat. Sho 46-11196. 2p., April 19, 1971. (Appl. Dec. 18, 1967, 1 claim).*

A device designed to remove the dust from the air filter of an air conditioner is described. The air filter is usually a finely meshed screen filter made of fibrous metal, glass wool, and synthetic resin fibers. Used for a certain period of time, it naturally becomes dirty with dust deposits. This causes a reduction in air flow and leads to the deterioration of air conditioning efficiency. Therefore, a dirty air filter must be periodically removed from the air conditioner for replacemene or cleaning. During the replacement of cleaning, the entire air conditioner must stop operation. Also, troublesome and time consuming work is required to replace or clean the air filter. The newly designed duster eliminates all these problems. An H shaped brushing device is fitted on the air filter screen in such a way that it can slide up and down. It consists of an H-shaped frame positioned horizontally and the brush or sponge-like material fitted to the inner surface of the frame. The brush comes in direct contact with the outer surface of the air filter screen. The guide frame is fitted directly onto the air filter frame so that the brushing device may slide up and down between the guide frame and the filter screen. The brushing device is suspended by two coil springs fitted to the upper frame of the air filter unit. A pull string is fastened to the lower side of the H frame. The string extends down to the pulley provided at the bottom corner of the air filter unit. From the pulley, it goes along the bottom of the air filter unit until it is outside of the filter unit; a grip is provided at the end of the string. The brushing device is usually held in the upper position by the springs. To brush dust off the filter screen, the string is pulled repeatedly. This effectively removes dust deposits from the filter screen, thus removing the need for replacing or cleaning the filter.

12800 APTIC NO. 30305

Hortig, H. P.

DESIGNING OF SPRAY TOWERS. *(Zur Auslegung von Spruehtuermen). Text in German. Chem. Ing. Tech., 42(6):390-396, March 1970. 5 refs. (Presented at the Jahrestreffen der Verfahrens- Ingenieure, Bayreuth, West Germany, Sept. 30-Oct. 2, 1969.)*

The general definition of a spray tower is an apparatus in which a finely dispersed product, in the form of a suspension or a solution, is being dried by a hot gas stream, whereby the gas moves either in parallel or in counterflow relative to the movement of the particles. This process has become increasingly important in recent years, for instance in the manufacture of paints, of protective agents for plants, and of pharmaceutical products. Starting from two movement equations relative to the trajectory of a particle of spherical shape and given diameter, the equation is based on a given initial velocity of the particle and its relative velocity to the gas movement and takes into account the coefficient of resistance and other constants. Graphs and monograms are developed from which practical answers can be derived by the designer in determining the required diameter and height of a spray tower. The main criterion is the length of time during which the particles are required to be in contact with the gas to ensure the desired heat transfer and drying effect. In actual practice, this time period may have to be between one and seven seconds depending on the application. The time required by particles to move through a vertical given distance hardly varies with the initial particle speed, contrary to the radial travel distance which varies considerably with the initial spray velocity. The ratio of spray angle versus time again shows little variation of time of movement in the vertical component, whereas the particle diameter has a rather drastic effect on the movement time, both in the vertical and radial components.

12801 APTIC NO. 30615

Hoshi, Akira and Shigeki Saito

DISPOSAL METHOD OF DUST. *(Funjin shoriho). Text in Japanese. (Hitachi Seisakusho K. K. (Japan)) Japan. Pat. Sho 46-16879. 2p., May 10, 1971. (Appl. April 5, 1968, 1 claim).*

A simple way to dispose of dust which has been collected in the hopper of an electric dust collector is described. A specially designed container bag is attached to the bottom spout of the hopper so that the dust can be taken into the bag without scattering. A liquid absorbent made of a mixture of surface active agent and a caking agent is contained in the bag, so that the dust can be removed from the bag as a cake, free of flying dust. The cake becomes solid with subsequent drying, thus permitting easier transportation. This method is suitably used for disposal of dust collected at a casting factory where it usually contains no valuables and the investment of a large sum of money for disposal is economically disadvantageous. The bag is made of a flexible material and comes in a tubular shape. Both the tape and bottom openings are equipped with a draw-string so that they may be easily closed and opened. When opened, the bottom should be as wide as the cross sectional area of the bag to allow easy removal of the dust cake. It is held in place and shape by a similarly shaped holder when attached to the hopper. The liquid absorbent is waterglass 80 liters of water, and a surface active agent.

12802 APTIC NO. 30203

Hurley, E. G.

GAS FILTRATION IN THE CARBON BLACK INDUSTRY. *Filtration Separation (Purley), 8(3):271-280, May/June 1971. (Presented at the Filtration Society, Manchester, England, Nov. 17, 1970.)*

Carbon black is produced by the partial combustion of oil to give a finely divided cloud of carbon by thermally cracking the unburnt oil. The product is removed from the smoke stream by filters. The filter is divided into several compartments, each of which has a tube plate into which the lower ends of woven fiberglass tubes are fixed. Below the tube plate is a hopper and rotary gas lock. Smoke enters the hopper and carbon black is retained on the inside of the tube cloth, while the gas passes through to the vessel and to the waste gas system. Alternative layouts for process filters, such as separate compartments, suction backflow, pulsed conveyor feed, and top feed tubes are discussed. All parts of the filter may experience condensation and corrosion when starting up from cold. Insulation, structural isolation, or steam tracing are recommended to reduce the amount of corrosion. The detailed design of filter elements is described, including such aspects as the cloth, metal fittings, tensioning, support rings, tube diameter, and tube plant design. The application of filtration to pneumatic conveying and to dust extraction is briefly discussed.

12803 APTIC NO. 30865

Hurn, R. W.

MOBILE COMBUSTION SOURCES. *In: Air Pollution. Arthur C. Stern (ed.), Vol. 3, 2nd ed., New York, Academic Press, 1968, Chapt. 33, p. 55-95. 43 refs.*

Mobile combustion sources include automobiles, trucks, buses, railroad locomotives, aircraft, and marine vessels. Pollutants from these sources contain both toxic compounds and organic materials that are not in themselves objectionable but which react in the atmosphere to form smog. In addition, objectionable smoke and odor, separately or together, may accompany other exhaust emissions. It is useful to treat internal combustion engine-powered vehicle emissions according to their origin within the vehicular system. Exhaust emissions may include carbon monoxide, unburned hydrocarbons, oxides of nitrogen, partial oxidation products, and particulate matter. Evaporative emissions and crankcase blowby, and the chemical composition and photochemical reactivity of hydrocarbon emissions are discussed. Air-fuel ratio and other operating variables which influence the relative properties of combustion products are cited. Automotive emissions control is discussed, as well as testing for certification and inspection of vehicles. The nature of diesel emissions is reviewed, including fuel and engine effects on diesel emissions. Gas turbines operate with fuel mixtures that, overall, are extremely lean compared with the mixture ratios used in spark-ignited piston engines. Emissions from automotive and aircraft gas turbines are mentioned.

12804 APTIC NO. 30685

Iida, Yasuo, Kimio Kubota, Tosho Ohira, Naoomi Yamaki, and Heigoro Aoyama

ON DURABILITY OF AUTOMOBILE EXHAUST GAS CLEANER. *(Jidosha haikigasu jokasochi no taikyusei ni tsuite). Text in Japanese. Tokyo-to Kogai Kenkyusho Nempo (Ann. Rept. Tokyo Met. Res. Inst. Environ. Prot.), vol. 2:88-95, March 1971. 10 refs.*

Twelve automobiles were selected from among some 3300 equipped with a catalyst type exhaust gas cleaner and investigated for the cleaner s performance in relation to the mileage run. The cleaners were A and C types equipped with a platinum catalyst and B type with a metal oxide catalyst. Each cleaner was installed about 0.9-2.0 m away from the end of the exhaust manifold. The reduction rate (%) of carbon monoxide, hydrocarbons was measured for each cleaner with 4-mode and 7-mode operations. The average rate of CO reduction for type A was 68% during idling and 44% during 4-mode operation in the first test (cumulative mileage about 12,400 km); the corresponding rates were 29% and 10% in the second test (mileage 15,800 km). For the type B cleaner, results were 30% and 13% in the first test (mileage, 8200 km) and 1.9% and 9% in the second test (mileage 9800 km). The type C cleaner showed a lower rate than either A or B types during idling and the 4-mode operation in both the first and second tests. The rate of HC reduction was lower than that of CO in all cases and was highest with type A followed by types B and C. The efficiency generally decreased as the mileage increased with an individual vehicle but this trend was not general. The durability of the cleaner will greatly differ with the individual vehicle, depending on various operating conditions such as fuel, driving pattern, maintenance,, and type and make of vehicle. The main cause for performance deterioration of the cleaner is lead and soot deposits from the exhaust gas. Tests of the initial efficiency of the cleaner after the catalyst was replaced with new one also show a great variation among individual automobiles, again indicating that durability of the cleaner depend on the individual vehicle.

12805 APTIC NO. 30257

Imazu, Masami and Hideyuki Nakazumi

VENTURI SCRUBBER. *(Benchuri Sukuraba). Text in Japanese. (Nippon Spindle Mfg. Co., Ltd. (Japan)) Japan. Pat. Sho 45-39600. 3p., Dec. 12, 1970. (Appl. June 8, 1967, claims not given).*

A new venturi scrubber is equipped with a simple device designed to automatically adjust and maintain at a predetermined speed the flow velocity of exhaust gas as it passes the throat of the venturi tube. When a venturi scrubber is used to collect dust contained in exhaust gas, high-speed gas flow is required for atomization of the wash liquid. Above all, the gas should flow at high speed when it passes the throat of the venturi tube at which point the wash liquid is atomized and jetted into the gas stream. However, the quantity of exhaust gas changes drastically from time to time, causing fluctuations of the flow speed. Especially when exhaust gas decreases in quantity and, therefore, in the flow speed sufficient atomization of the wash liquid is impossible. Dust collection efficiency decreases accordingly. To meet this problem, the new venturi scrubber features an automatic flow-speed regulator wherein a cone-like object in the throat of the venturi tube is suspended by a rod running through the upper portion of the tube and the lower portion of the exhaust pipe connected to the venturi tube. The upper portion of the rod sticking out of the pipe is equipped with a spring that keeps pulling the rod upward with some proper force. Exhaust gas flowing through the throat or the narrowest portion of the venturi tube exerts a downward force on the cone like object suspended therein. As flow quantity and speed of the gas decrease, this downward force applied to the cone-like object naturally decreases, so that the object is pulled upward by the spring until the throat opening is narrowed to the point at which the force exerted by the spring becomes balanced with the downward force applied to the object; the upward force now increases with the narrowing of the throat opening. Thus, the flow speed at the throat is kept constant, irrespective of variation in the quantity of exhaust gas.

12806 APTIC NO. 30781

Inouye, Tsutomu

ON AIR POLLUTION CONTROL OF OSAKA CITY. *(Osaka-shi no taiki osen boshi ni tsuite). Text in Japanese. Nenryo Oyobi Nensyo (Fuel and Combustion), 38(4):33-44, April 1971.*

To achieve the environmental standards set by the national government, Osaka Prefectural Government established Blue Sky Plan No. 1 for the large coastal factory complex and Blue Sky Plan No. 2 to cope with local pollution caused by domestic heating in winter. Osaka s consumption of oil is 11.9% of the national total, and of coal, 8.5% of the national total. The volume of sooty dust is measured at 11 stations in Osaka City; it has decreased since 1961. The decrease was conspicuous in the industrial area; in the residential and commercial areas, it leveled off. The decrease is due to the use of liquid instead of solid fuel, and the gradual adoption of dust elimination equipment. Sulfur dioxide is monitored at 33 stations. It has gradually increased since 1960 due to the consumption of heavy sulfur oil. Over 0.2 ppm SO2 occurred at the Hygiene Research Institute monitoring station. The amount of smog has gradually decreased since 1960 in keeping with the decrease of sooty dust; it is believed to be due to the use of oil rather than coal. To accomplish Blue Sky Plan No. 1, it is necessary to decrease the sulfur oxides discharge from large coastal factories by more than 40%. Blue Sky Plan No. 2 is to be achieved by restricting the pollution level to less than 1.5 mg/day/100 sq cm. The workshops will be guided to use fuel with a sulfur content of less than 10% after 1970, and after 1972, to use still further sulfur-free fuel. In the newly constructed buildings, facilities which will not discharge sulfur oxides, such as air conditioning by electricity or gas, are to be installed.

12807 APTIC NO. 30636

Ishihara, Hinya and Ichizo Ishimori

AIR INJECTION TYPE EXHAUST GAS PURIFIER USING AIR BLOWER DRIVEN BY SUCTION GAS TURBINE. *(Kyuki tabin kudo buroa o mochiita kukifunshashiki haiki joka sochi). Text in Japanese. (Nippon Denso Co., Ltd. (Japan)) Japan. Pat. Sho 45-37488. 4p. (Appl. March 6, 1967, claims not given).*

This air injection type exhaust gas purifier was designed to remove carbon monoxide and hydrocarbons by burning them in the exhaust pipe near the exhaust manifold. It features an air blower driven by the turbine operating on intake air for the engine. The turbine was designed to operate at higher speeds when the engine is in idling, low speed, or speed reduction, and in lower speed when the engine is in high speed operation. In a conventional air injection type, air for exhaust gas purification is fed into the exhaust manifold by means of an air pump driven by the crankshaft, so that the pump operates in high speed when the engine operates in high speed, when air for exhaust gas purification is actually needed less. Therefore, the air that has become unnecessary in the high-speed operation has to be discharged into the atmosphere. Another disadvantage is that, linked with the engine, the air pump often revolves at very high speeds, and wears out in a shorter period of time. In the new device, the turbine and the air blower are both connected to the air cleaner. In the pipeline connecting the turbine to the intake pipe to the intake manifold, the airflow limiter valve is linked with, and operated by, the engine s suction negative pressure detector. When the engine s suction negative pressure is greater in idling or low-speed operation, the turbine operates at high speed with more air taken in from the air cleaner; thus the air blower is driven at high speed to jet more air into the exhaust manifold to induce active combustion of the carbon monoxide and hydrocarbon. When the engine is operating at high speed, the negative pressure is small and the turbine operates more slowly, reducing air supplied into the exhaust manifold since the air blower also revolves at slower speed. With the engine brake applied, the negative pressure of the engine increases to the maximum; but the air limiter valve is designed to close the pipeline a few seconds after the engine brake is applied. Possible discharge of large amounts of unburnt fuel caused by an abrupt closure of the throttle valve may be avoided. Even when in the closed position, the air limiter valve lets some air flow through its vents and allows the turbine to operate, but at lower speed.

12808 APTIC NO. 30177

Ishiyama, Akira

ELECTRIC DUST COLLECTOR. *(Denki shujin sochi). Text in Japanese. (Nippon Cement Co., Ltd. (Japan)) Japan. Pat. Sho 45-39999. 3p., Dec. 15, 1970. (Appl. May 13, 1966, claims not given).*

This invention involves an innovation in the discharge line of an electric dust collector. One or more additional cylindrical weights are attached to points midway along the line, in order to avoid vibration. An electric dust collector usually consists of dust collection plates (each a positive electrode), and discharge lines (each a negative electrode), arranged in alternating order. To promote corona discharge between the two electrodes, the negative electrode is usually a fine, long discharge line fitted with a weight at its lower end. To remove the dust arrested by the collector and keep both electrodes clean for a stronger electric field, a hammering device is provided at the top side of the electrode assembly. When electric voltage is applied between the collector plate and the discharge line, the latter is subject to the force pulling it toward the former. Meanwhile, vibration caused by the hammering device, alternating force caused by vortex current generated behind the discharge line, and wind pressure of the gas entering combine to accelerate vibration of the line. This is especially true of a large dust collector, where the discharge line measures several meters. Vibration increases sharply with the resonance that takes place, approaching the frequency of the natural vibration of the line dictated by the tension and dimensions of the line. The excessive vibration often causes a short circuit between the two electrodes, resulting in malfunction. A line equipped with the cylindrical weight at a midway point becomes changed in its natural vibration frequency and reduced in amplitude of vibration, thus remedying the defect noted above.

12809 APTIC NO. 30639

Ito, Kanji

DUST REMOVAL DEVICE. *(Jojin sochi). Text in Japanese. (Nippon Denso Kabushiki Kaisha Kariya Shi (Japan)) Japan. Pat. Sho 46- 11197. 2p., April 19, 1971. (Appl. Nov. 26, 1965, 1 claim).*

A combination of a cyclone and an electric dust collector is described. The cyclone-type dust remover is usually effective for removing dust of 10 micron grain size, but fails to remove micro-dust of one micron. The electrostatic dust collector is effective in removing the smaller dust, but ineffective in removing the larger dust. A helical line electrode is fitted to the inner surface of the cone-shaped lower part of the cyclone. The electrode is completely insulated from the cyclone. It is connected to the positive output terminal of DC high-voltage power source, while the cyclone is connected to the negative output terminal. With this arrangement, the new dust remover assures a multiplied efficiency, produced by physical and electrical dust removal functions. The upper part of the cyclone is cylindrical and the lower part conic. The air intake port is in the upper side of the upper part, while the air exhaust pipe is fitted at the center of the top cover. The electrode is fitted to and along the inner side of the coniform lower part of the cyclone. As dirty air is taken in through the intake port, it moves gradually downward while turning. The air flow becomes slower as it nears the bottom tip of the coniform bottom. The larger-size dust thus falls down to go out through the bottom opening. The smaller dust, still moving along the inner wall of the cylindrical section, receives a negative charge. This dust is thus attracted by the positively charged electrode. The performance of the positive electrode will decrease as the dust accumulates. Two helical electrodes connected in parallel to the power source, may be provided for alternate use. When one is in use, the other will be vibrated to shake off the accumulated dust.

12810 APTIC NO. 30667

Iwai, Shigehisa, Ko Haruyama, and Ko Kozuki

ON PLASTICS INCINERATOR. *Purasuchikku senshoro ni tsuite). Text in Japanese. Toshi to Haikibutsu (J. Solid Waste), 1(1): 15-19, May 1971. 2 refs.*

The technical problems in burning plastics include damage to the grid, incinerator, and kiln; corrosion of metal; and the production of smoke and harmful gases. When paper was mixed with plastic, after the paper had finished burning, the plastics continued to burn at the bottom of the incinerator, and the upper part of the incinerator got cold. A rotary kiln was inadequate since air cannot be supplied where it is wanted. Smoke emission can be decreased when the temperature inside the kiln is maintained at 1000 C. The acidic gas can be absorbed by an alkali solution when its temperature is lowered. Hydrocyanic acid is broken down into water, carbon dioxide, and nitrogen at 1000 C. Experiments were conducted using a 4.4 cu m incinerator. The equipment was designed to burn 50-70 kg plastic/hr of 10,000 kcal/kg. It featured a pan-type stoker and scraper, and more draft ducts than the usual type of incinerator. The dust concentration was 1 g/cu Nm. When the temperature was kept above 900 C, the emission of smoke decreased to less than 0.1 g/cu Nm. When it was cleaned, the emission was further reduced. The present standard is less than 0.2 g/cu Nm. Chlorine can be eliminated by increasing the number of washing steps, which greatly reduces the concentration from the 3000 ppm before washing. The speed of breakdown on the fire grid should be designed to be 80-100 kg/sq m/hr. Plastics can be easily disposed of if an adequate type of incinerator is used. If the illegal disposal of plastics continues, the marketability of plastics will decrease. Gasification of plastics is not economically advantageous.

12811 APTIC NO. 30601

Janas, Marian and Jozef Gzielo

THE INFLUENCE OF SULPHUR CONTENTS IN FUEL OIL ON DESULPHURIZING, FLUX CONSUMPTION AND OUTPUT OF OPEN HEARTH FURNACES. *(Wplyw zawartosci siarki w mazucie na przebieg odsiarczania, zuzycie topnikow i wydajnosc piecow martenowskich). Text in Polish. Wiad. Hutnicze (Katowice), no. 11:231-235, 1970. 3 refs.*

The effect of sulfur content in mazut on desulfurization, flux consumption, and output of open hearth furnaces was studied. The difference between the sulfur content in the furnace load and in the steel gave the amount of sulfur transferred from fuel oil into steel. A 0.1% increase in sulfur content of the fuel oil resulted in an increase of sulfur content in the melt by 0.0024%. Desulfurization rate increased with sulfur content in the melt (and thus in fuel oil) but at the same time the consumption of flux (CaO) increased by 25 kg/l ton steel for a 0.1% increase in sulfur content; furnace output dropped by about 1 t/hr.

12812 APTIC NO. 30249

Jones, James N.

APPARATUS FOR EXTRACTING SMOKE AND GREASE ELEMENTS FROM COMBUSTION GASES. *(William R. Tudor, Birmingham, Ala.) U. S. Pat. 3,563,005. 7p., Feb. 16, 1971. 3 refs. (Appl. Oct. 22, 1968, 8 claims).*

The present invention provides a means of collecting and rendering the grease particles from the ventilator systems of commercial kitchens in thickened solid form for ready disposal or for further processing. Combustion gases are first cleaned in a hollow-shelled unit equipped with a movable filter. When the filter is arranged over the inlet of the cleaner unit housing, grease and foreign particles are filtered out of the combustion gases and constrained in the filter. When the filter is arranged over the outlet opening of the housing, hot water or hot detergent liquid passes through the filter in a reverse direction, thereby dislodging the particles and moving them to a collection tank. The tank slows down the passage of liquid and allows time for the liquid to cool and the grease to rise to the upper level of the tank. A continuous loop or circuit enables the detergent hot liquid to be reused.

12813 APTIC NO. 30734

Jonke, A. A., E. L. Carls, R. L. Jarry, L. J. Anastasia, M. Haas, J. R. Pavlik, W. A. Murphy, C. B. Schoffstoll, and G. N. Vargo

REDUCTION OF ATMOSPHERIC POLLUTION BY THE APPLICATION OF FLUIDIZED-BED COMBUSTION. (ANNUAL REPORT). *Argonne National Lab., Ill., Chemical Engineering Div., AEC Contract W-31-109-Eng-38, Rept. ANL/ES-CEN-1002, 87p., 1970. 19 refs.*

NTIS: ANL/ES-CEN-1002

Combustion of fossil fuels in a fluidized bed, to which particulate limestone is added to react with sulfur oxides, is being studied as a means of reducing the emission of sulfur dioxide released during combustion. Coal has been burned in a six-inch diameter bench-scale combustor to study the following: the effect on SO2 removal of the limestone particle size, type of limestone, temperature, calcium to sulfur ratio, fluidized-bed depth, and recycle of elutriated fly ash to the bed; the extent of calcination and sulfation of limestone; and factors affecting the nitric oxide concentration in the flue gas. In natural gas combustion experiments, measurements were made of the extent of SO2 removal, the NO level in the flue gas, and the combustion efficiency. Mathematical models have been developed to estimate the extent of reaction of limestone with SO2 during coal combustion and the effect of nonuniform feeding of coal on combustion efficiency. (Author abstract)

12814 APTIC NO. 30339

Jonsson, Sven-Erik

EVAPORATION OF BLACK LIQUOR: DEVELOPMENT TO DATE FROM THE STANDPOINT OF ENVIRONMENTAL PROTECTION. *(Indunstning av svartlut: Nagra utvecklingslinjer hittills fran miljovardssynpunkt). Text in Swedish. Svensk Papperstid. (Stockholm), 7:191-196, April 15, 1971.*

Three problem areas in the evaporation of black liquor are: reducing the loss of solids (containing sodium sulfate); recovering sulfur compounds from liquid and gaseous wastes; undesirable biochemical oxygen demand of condensates. The volatile sulfur compounds liberated by the evaporation of black liquor are 80-90% hydrogen sulfide, the remainder consisting of thiols. Unless measures are taken to prevent it, sulfur compounds will be found partly dissolved in the condensate and water from the vacuum pump set, while part will be liberated in the form of uncondensable gases. The oxidation of black liquor has a history of 40 years. In more recent times the Uddeholm method has been used to recover sulfur compounds from the liquid and gas phases. The condensate is purified in a column, which removes almost 100% of the sulfur compounds. Gases with an unpleasant odor are collected and neutralized by means of combustion. Another new method is the Delary system, which is also described.

12815 APTIC NO. 30900

Juentgen, H. and K. Knoblauch

RECENT DEVELOPMENTAL TRENDS OF WASTE GAS DESULFURIZATION IN THE U. S. AND GERMANY. *(Neuere Entwicklungstendenzen der Rauchgasentschwefelung in den USA und Duetschland). Text in German. Mit. Ver Grosskesselbesitzer, 51(3):211-218, June 1971. 13 refs. (Presented at the VGB-Fachtagung Emissionen 1970, Wuppertal, West Germany, April 3, 1970 Regensburg, West Germany, April 17, 1970, and Travemuends, West Germany, April 30, 1970.)*

Since high stacks are no solution to the problem of emissions, and fuel desulfurization is expensive, waste-gas desulfurization processes are receiving renewed attention. In the U. S., the emphasis is on developing dry desufurization processes. Considerable work has been done on the North American Rockwell process which is based on the conversion of SO2, with a mixture of potassium carbonate, sodium carbonate, and lithium carbonate. Regeneration of the sulfites and sulfates formed by the reaction takes place in two stages. First, the reaction products are reduced to sulfites, which are converted with water vapor and carbon dioxide to carbonates. The end product is sulfur, which can be stored. In the Claus process, hydrogen sulfide is added to flue gas, which is then catalytically converted to elemental sulfur. The Monsanto process converts SO2 to SO3 on a catalyst and yields sulfuric acid. In the Wellman-Lord-process, the SO2 is bound in the form of sodium bisulfite by, for example, hydroquinone. A method developed in West Germany uses activated coal to convert SO2 in the presence of water vapor and oxygen to sulfuric acid. The activated coke is recovered by thermal treatment or by scavenging. In the first case, SO2 is obtained as an end-product; in the second, as diluted sulfuric acid. Desulfurization of waste gases will soon be advanced enough to permit practical application. Costs are estimated to range between $3.75 to $13.25/KWh.

12816 APTIC NO. 30621

Kawai, Tadayasu and Hideo Nikami

ON DESULFURIZATION OF HEAVY OIL. *(Juyu no datsuryu ni tsuite). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 38(2):105-116, Feb. 1971. 2 refs.*

Direct and indirect methods for the hydrodesulfurization of heavy oil are reviewed. Among the indirect methods in use in Japan are the Isomax method of CRC and UOP, and the Gulf Hydrofiner, Trickle, and Unicracking-HGO methods. The basic mechanism of the Isomax method is as follows: The raw oil is mixed with hydrogen and heated to the predetermined temperature. It is then fed into the reaction tower from above. After exchanging heat with the raw oil, the substances formed by the reaction are further cooled and separated into separate hydrogen-rich circulating gas by high and low-pressure separators, respectively. The substances are then reheated and fed into the stripper through the top of which the light-quality gas and naphtha distillate are separated and from the bottom of which low-sulfur refined oil is obtained. The gas from the low-pressure seperator and from the top of the stripper both contain large amounts of hydrogen sulfide, so they are fed to the sulfur recovery device for recovery of sulfur. Direct hydrodesulfurization processes now practiced in Japan include the RCD-Isomax, Gulf-HDS, and H-Oil methods. While the first two methods use a fixed-bed reaction tower, the latter (H-Oil) method features an ebullated bed tower. The basics of the H-Oil process are described. The reaction tower of the H-Oil process is characterized by good temperature distribution, absence of plugging and continuous replacement of catalyst. Also described is the RCD (Reduced Crude Desulfurization) Isomax process developed by Universal Oil Products Co. Initial construction costs are estimated for 100,000 BPSD oil refinery equipped with a 50,000 BPSD heavy oil hydrodesulfurization device. According to the estimate, the desulfurization device accounts for 37% of total construction cost. Direct and indirect desulfurization costs/kiloliter of oil are compared. When the desulfurization device is operating at 90% of its capacity, for example, the desulfurization cost/kiloliter of oil is greater for the direct process than the indirect process, but it has a higher desulfurization efficiency.

12817 APTIC NO. 30429

Kawarada, Kiyokazu and Fumio Tamura

DUST CLEANER FOR AIR FILTER OF AIR CONDITIONER. *(Kuki chowaki nado no ea firuta no soji sochi). Text in Japanese. (Hitachi Seisakusho K. K. (Japan) Japan. Pat. Sho 46-12459. 3p., April 30, 1971. (Appl. Jan. 17, 1968, claims not given).*

A dusting device that can be combined with the air filter unit of an air conditioner so that the air filter can be dusted clean without detaching the filter from the air conditioner is described. Usually, the air filter must be detached from the air conditioner for periodical cleaning. The air filter unit is usually located in the bottom of the air conditioner casing. The new air filter duster is an oblong brush fitted under the air filter. The top end of the brush is mounted in a guide rail fitted under the inner end of the filter unit; the handle protrudes in front and slides along the gap formed between the front end of the filter unit and a supporting rod located underneath it. This supporting rod serves as the front guide of the brush unit and also as the shaft of the hinge-like cover for the air intake port. When the cover is in the open position, the catch is engaged with the handle and the brush unit, staying along the front, or outer, end of the filter unit. To clean the filter unit, the handle of the brush unit is held and moved inward and outward. When the brush unit is slid inward, the catch of the air intake port cover is automatically disengaged from the handle of the brush, so that the cover swings down by its own weight to close the air intake port. This avoids dusty air from coming in during the cleaning. Dust removed from the air filter is retained by the dust pan provided below the air filter.

12818 APTIC NO. 30814

Kitano, T., Z. Kawase, S. Ito, and S. Yuge

AIR POLLUTION AROUND THE ROOF-TILE-KILN. *(Yuge kojo shuhen no taiki osen chosa). Text in Japanese.*

Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):162, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, Tokyo, Japan, 1970.)

Many roof-tile kilns in northern Saitama Prefecture changed into manufacturing glazed tiles in recent years and caused considerable fluoride damage in the mulberry fields in the area for the last three years. Approximately a 400 m radius of these factories, especially the leeward areas, were completely unsuitable for sericulture; damage to rice, corn, and cucumber was also noted. The Saitama Prefectural Institute of Public Health ordered an installation of detoxification devices to the twelve glazed tile factories in 1970. The device is designed to clean fluoride and other fumes from the tunnel kiln by a 10% solution of sodium hydroxide and to turn the waste liquid into calcium fluoride and sodium sulfite. A cooling tower prevents the rise of the absorbent and white smoke. The fluoride content in the air permitted by the Saitama prefecture law is 3 ppm. As a result of the detoxification device, sulfur oxides in the smoke decreased from 29.1 to less than 1.0 ppm: hydrogen fluoride, from 6.4 to 1.2 ppm; and dusts, from 18.8 to 1.5 mg/cu m. The fluoride content in mulberry leaves decreased from 6.4 to 2.0 mg/100 g in 80 m west of the factory; from 1.5 to 1.4 in 140 m east of the factory; and from 3.1 to 1.6 in 200 m north of the factory.

12819 APTIC NO. 30577

Koelbel, Herbert and Joachim Schulze

THE LONG-TERM TECHNICAL AND RESEARCH PLANS IN THE CHEMICAL INDUSTRY. II. AIMS AND METHODS OF RESEARCH PLANNING. *(Die langfristige technische Vorausschau und Forschungsplannung in der chemischen Industrie. II. Zielsetzung und Methoden der Forschungsplanung). Text in German. Chemiker Ztg. (Heidelberg), 95(12):537-547, June 1971. 42 refs. Part I. Ibid., vol. 95:395-405, 1971.*

The tolerance limits for pollutants emitted by the chemical plants are met, to a large extent, by dilution or by changing the location to unpolluted areas without set limits. Soon, such methods will no longer be sufficient. Also, the costs for these methods are rising. To cite an example, the 200 m high stack built by the Shell Refinery in Pernis was five times as expensive as the 100 m high stack previously in use and ten times as expensive as the 50 m stack which was first in use. A suitable alternative would be the avoidance of pollutants by process changes, as is being done by the Bayer-Double-Contact process for sulfur dioxide oxidation. Such process changes will be more economical in the future than any other method. In the cellulose and paper industry, and in iron and steel pickling stations, the chances of economically recovering pollutant materials are good.

12820 APTIC NO. 30141

Konstantinoff, W. I.

CHARACTERISTICS OF CONDUCTIVITY: A METHOD FOR CONTROL OF THE CURRENT/VOLTAGE CHARACTERISTICS OF ELECTROSTATIC PRECIPITATORS. *(Charakteristiken der Leitfaehigkeit: Eine Methode zur Kontrolle der Strom-Spannungs-Charakteristiken von Elektrofiltern). Text in German. Staub, Reinhaltung Luft, 31(2):64-66, Feb. 1971. 3 refs.*

The effect of constructional changes, such as the change of the diameter of the ionizing electrodes, or technological changes, such as the effect of the waste gas temperature on the efficiency of the electrostatic precipitator can be determined by the characteristic conductivity when the curves are not terminated on the abscissa but are continued until they reach the ordinate. The characteristic conductivity is defined as the ability of ion transport in the electrode space. It can be expressed by ro plus ro sub o equals K by U, where ro is the conductivity, ro sub o the critical conductivity representing the state non-conductivity/conductivity, K is a proportionality coefficient, and U the voltage of the electrodes. With changes in the properties of the electrostatic precipitator, the conductivities shift parallel to each other; the coefficient K remains constant and only the value of the critical conductivity changes. With operational changes of the electrostatic precipitator (that is, of temperature and gas humidity), the critical conductivity remains constant and coefficient K will change.

12821 APTIC NO. 30784

Kubota, Kimio, Toshio Ohira, Yasuo Iida, Hajima Saito, Toshiaki Iwata, Minoru Oka, Tokuyuki Odagaki, and Naoaki Muraki

ON CONTROL TEST FOR BLACK SMOKE EMITTED FROM DIESEL AUTOMOBILES - INTERMEDIATE REPORT. *(Dizeru jidosha haiki kokuen yokuseishiken ni tsuite - Chukan hokoku -). Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot)., vol. 2:96-102, March 1971. 1 ref.*

The effectiveness of various additives in reducing black smoke emissions from diesel engines was tested. The additives were first tested with the diesel engine mounted on the bench; in the second test, those found effective were retested with the engine on the bench operated at various engine conditions; e.g., in a state of poor maintenance in which more black smoke is likely to be generated. The effective additives were tested further with normally operating city buses to evaluate dirtiness, damage, soot deposits, and abrasion of various parts of the engine after operation of the buses for a specified period of time. Of 26 kinds of additives tested, 18 were composed chiefly of barium. Of the no-barium additives, only one was effective. Of the 18 containing barium, 6 were remarkably effective, another 6 were just effective, and the remainder were not effective enough, (two of these were utterly ineffective). The most effective 6 contained 1 g of barium per liter of fuel. With the barium additives, the black smoke reduction rate increased with a higher barium content in the additive but the effect levels off at a certain ratio. The effect of the additive is higher when the density of black smoke before addition of the additive is lower, and lower when the density is higher. The use of the additive generally results in an increased fuel consumption but only 3% at the most. No increase of decrease of carbon monoxide or nitric oxide density was observed with use of the additive. Barium sulfate was only detected by qualitative analysis of the exhaust gas. White deposits believed to be barium compounds were observed at the cylinder head combustion chamber and piston head. Soft alien material was found on the valve face and seat of the intake valve. This alien material is not usually observed when no additive is used.

12822 APTIC NO. 30583

Kuehnert, K.

STEAM PRODUCTION THROUGH WASTE HEAT UTILIZATION. *(Dampferzeugung durch Abwaermeververtung). Text in German. Tech. Mitt., 64(6):212-218, June. 1971.*

Waste gases from heating furnaces and reactors frequently have temperatures which permit the economical production of steam. If the waste gases contain dusts, erosions might occur at an inadequate layout of the heating surfaces. A suitable gas speed must be found which is dependent on the type of dust, the grain size, and the arrangement of the heating surfaces. Practical experience has shown that at parallel flow a speed of eight m/sec is necessary to avoid erosion. Low-temperature corrosion can be avoided by limiting the heating surface temperatures to 400 to 450 C. Overheating of the steam is conducted in separate units. Steam production from waste heat become more economical as the temperature of the waste gas increases. Waste heat boilers can be economically operated in the metallurgical industry. The dust-laden gases from steel manufacturing must be cooled for cleaning; the heat, thus liberated, can be used for steam production. Other examples are the chemical and petrochemical industries.

12823 APTIC NO. 30350

Kurmeier, H.

THE LIMESTONE-TOWER PROCESS FOR DEODORIZING ODOROUS INDUSTRIAL WASTE GASES. *(Das Kalkstein-Turmverfahren zur Desodorierung von riechenden Industrieabgasen). Text in German. Gesundh. Ingr., 92(6):169-173, 1971. 9 refs.*

For ten years now, odorous waste gases from industrial processes have been treated by passing them through a tower packed with calcium carbonate. Prior to entrance into the tower, chemicals are sprayed into the gases. This process has been successfully applied in the food industry. Criticism that the injection of chlorine into the odorous waste gas prior to entry into the limestone tower does not eliminate the odor but masks it was unfounded by laboratory tests. Chlorine was converted into neutralized hydrochloric acid and HC10. A medium-size plant with a waste gas througput of 40,000 cu m/hr requires about 200 g Cl/hr.

12824 APTIC NO. 30244

Kuroda, Hiroshi, Yasuo Nakajima, Yoshimasa Hayashi, and Kunihiko Sugihara

HEAT CAPACITY CHANGES PREDICT NITROGEN OXIDES REDUCTION BY EXHAUST GAS RECIRCULATION. *(NOx haishutsu seigyo no tameno haiki kanryu koka no jitsuyotekina kaiseki hoho ni tsuite). Text in Japanese. Nissan Giho (Nissan Tech. Rev.), (6):3-12, Jan. 1971. 3 refs.*

Exhaust gas recirculation decreases the peak combustion temperature and, thus, reduces the concentration of nitrogen oxides in the exhaust of a spark ignition engine. It is hypothesized that nitrogen oxides formation is primarily affected by the heat capacity of the combustion gases and recycled exhaust. This hypothesis was tested by admitting inert gases, such as helium and argon, carbon dioxide, and water, in place of the recycled exhaust gas. The test data confirmed the validity of the hypothesis and indicated that engine output and efficiency are significantly affected by the heat capacity of the combustion gases. It is concluded that exhaust gas recirculation functions by increasing the heat capacity of the combustion gases. The correlative changes in nitrogen oxides and engine performance can be predicted from these heat capacity considerations. These studies should be useful in evaluating various nitrogen oxides control techniques. (Author summary modified)

12825 APTIC NO. 30375

Kuwata, Tsutomu, Yutaka Oguchi, and Koji Nomura

HYDROGENIZATION REFINERY METHOD OF RAW MATERIAL CONTAINING HC. *(Tanka suiso ganyu genryo no suisoka seisei syorihoho). Text in Japanese. (Nippon Sekiyu Co. (Japan) Japan. Pat. Sho 45-38144. Dec. 2, 1970 8p. (Appl. May 1967, claims not given).*

A method of hydrogenating raw materials which contain various hydrocarbons by using an improved catalyst was invented. The raw materials containing hydrocarbons have impurities such as sulfur compounds, nitrogen compounds, oxygen compounds, and unsaturated organic compounds. The raw material containing HC is contacted with hydrogen and reacted in the presence of a catalyst. The catalyst is an activated metal carried by a mixture of alumina hydrate which is dried, sintered, and molded. The diameter consists of fine particulates and alumina hydrogel. The mixture of the diameter substance and alumina hydrogel is generally extruded. The catalyst is very porous. The catalyst is more active than the catalysts prepared in traditional ways. When hydrogel is used, the decomposition and lightening of the raw material is suppressed and the yield does not decrease. The invention is applicable to either continuous or other reaction types. In the continuous method, various known beds can be used. Pre-desulfurization can also be done. The reaction conditions are 200-500°C, 10-300 kg/sq cm g pressure, a velocity of the raw material oil of 0.2-10 vol/vol/hr, and a ratio between hydrogen and the raw material oil of 150-3000 NTP.

12826 APTIC NO. 30399

Liesegang, Dietrich

WET COLLECTORS FOR CLEANING OF GASES FROM CUPOLA FURNACES. *(Nassabscheider zur Reinigung von Kupolofengasen). Text in German. Giesserei (Duesseldorf), 58(12):362-366, June 1971. 6 refs.*

Venturi scrubbers have been used for cleaning the gases from cupola furnaces for twelve years. Wet electrostatic precipitators are particularly suitable for cleaning the waste gases of large furnaces with more than 12 tons/hr of melting capacity. Venturi scrubbers comprise a saturator, the actual venturi pipe, and the separator. Furnace pressure regulators, blocking mechanisms, the purification and neutralization station, a circulation water system, a ventilator, and a stack are also required. For the wet electrostatic precipitator, a saturator where the waste gases are cooled to dew point temperature is required. The gases reach the wet precipitator with temperatures between 50 and 70 C. Vertical electrostatic precipitators are usually used with a cylindrical steel jacket. The collection electrodes are usually in the form of tubes, honeycombes, or sheetsteel stripes, and the ionizing electrodes in the form of round or square wires. Both types of filters have high collection efficiencies and require little maintenance. Apart from the dust, 50% of the sulfur which is present in the waste gas in the form of sulfur dioxide and sulfur trioxide is also retained and neutralized by the sodium lye contained in the circulating water. The data of four typical high-capacity wet collectors for cupola furnaces are listed.

12827 APTIC NO. 30276

Lux, Herbert and Hardi Stange

RESULTS OF FIVE-YEAR EFFORTS FOR REDUCTION OF FLUORINE EMISSIONS. *(Ueber Ergebnisse fuenfjaehriger Bemuehungen um die Verminderung von Fluoremissionen). Text in German. Chem. Tech. (Berlin), 23(4/5):264-266, April/May 1971. 2 refs.*

When various methods were investigated for the removal of hydrogen fluoride from waste gases, such as packed columns and absorption on activated charcoal or limestone, it was found that absorption was not efficient. The use of packed towers requires that the flow rate not exceed one m/sec. Each packed tower must be operated with an alkaline solution; a five to 10% sodium or potassium lye solution can be employed. While packed columns are easy to maintain, some production processes have waste gases which carry dust that may form insoluble products with the scrubbing fluid. Dust collectors should precede the packed tower in such cases. It is also advantageous to force the gases through the tower, to avoid some of the problems which its moveable parts may present.

12828 APTIC NO. 30154

Matsumoto, Keishin and Naoomi Yamaki

STUDY ON THE PROCESSING TECHNIQUE FOR AUTO EXHAUST. *(Jidosha haiki gasu no shori gijutsu nikansuru kenkyu). Text in Japanese. Kokuritsu Kenkyujo no Kenkyu Seika (Researches of Government Research Inst.), no. 1:295-296, Dec. 1969. 7 refs.*

Cobalt, iron, copper, manganese, and chromium oxide base catalysts were tested for activity, resistance to heat and lead compounds, and cost. Among the coprecipitated catalysts, copper oxides magnesia-alumina (?) was found to be the best in the activity and heat resistivity. Among the infiltrated catalysts with an alumina carrier, a platinum or copper oxide base catalyst was effective. Four kinds of catalysts were prepared by blending two kinds of noble metals and were placed in a clarifier attached to 16 passenger cars of 2000 cc. A road test revealed that the performance of the clarifier for carbon monoxide depended on the running condition and fuels used. Drastic degradation of the catalyst was observed for gasoline vehicles, but medium degradation for liquefied petroleum gas for vehicles. A noble metal base catalyst was applicable to LPG vehicles, but the catalyst life must be improved before any catalysts can be applied to gasoline vehicles. The addition of five to 20% methanol to gasoline resulted in a considerable reduction in CO, but on some occasions an accompanying increase in hydrocarbons was observed. More study is needed for blending stability, vapor lock, or carburetor improvement before the methanol blended gasoline is put into practical use. An online data processing method was developed for the continuous gas analysis data obtained from chassis dynamometer tests.

12829 APTIC NO. 30616

Matsuo, Katsuichi

FILTERING DEVICE TO REDUCE CO OF EXHAUST GAS. *(Haikichu no issankatanso rogen sochi). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 46-11607. 2p., April 22, 1971. 3 refs. (Appl. Aug. 19, 1966, claims not given).*

A filter device is described which removes about 70% carbon monoxide in automotive emissions. It is readily attached to the exhaust port of the exhaust pipe muffler. The main casing is tubular, about eight to nine cm, and separable into two tubes at the mid-section. Both ends of the main casing are provided with a funnel-like cover. Seven small pipes, provided with a number of small side holes, are installed horizontally in the main casing. The internal space of the main casing is then packed up with a granular filter medium, which is made of an earthy substance excavated at Isahaya, Nagasaki Prefecture, Japan. The substance is originally a sort of sludge; it dries and then is crushed to make the filter medium. The substance is composed of 32.3% organics, 0.97% nitrogen, 59.09% coarse ash content, 102 ppm phosphorus, 0.43% potassium 0.168% calcium, 2.08% iron, 17.42% silicon, 0.01% sodium, 0.7 ppm boron, 0.025% magnesium, 8.6% water, fluorine, manganese, copper, cobalt and zinc. The substance has proven to be very effective in reducing the CO of the automotive exhaust gas. The grain size of the filter medium is about the size of a sesame seed or rice grain. The filter medium may be substituted by that made of natural diatomaceous earth.

12830 APTIC NO. 30193

Messman, Henry C.

DESULFURIZE COAL? Chem. Tech., Feb. 1971, p. 114-116. 9 refs.

Bench-scale work was carried out on a coal-desulfurization process that is expected to yield char containing less than one percent sulfur. The process is based on mixing crushed coal with soda ash in hot water, fluidizing and preheating the causticized coal, and then passing it to a devolatizing bed fluidized with a mixture of steam, water gas, and hydrogen sulfide. This bed is maintained at 450 C. The resulting causticized char is passed to a desulfurizing bed where it is maintained for about 30 min at 775 C. Next it flows to a sodium-stripping bed maintained at 900 C. This bed volatizes most of the sodium values to prevent ash buildup in the product. Finally, the desulfurized and stripped char flows to a bed fluidized with low-pressure steam. Here the char is cooled to about 400 C and discharged. The process can probably be carried out in a compact basic-refractory- lined carbon steel unit. In a plant having two such units, it is estimated that coal can be desulfurized for approximately $1.10/ton plus about seven percent fuel value penalty.

12831 APTIC NO. 30262

Meyer, Hans G.

SUCCESSFUL AIR MONITORING IN A CHEMICAL PLANT. *(Erfolge bei der Luftueberwachung in einem Chemiewerk). Text in German. Chemiker, Ztg. (Heidelberg), 95(10):449-452, 1971.*

The Leverkusen plant of Farbenfabriken Bayer AG has reduced its sulfur dioxide and inorganic and organic dust emissions. The three power plants belonging to the industrial complex emitted about 70% of the SO2 discharged by the entire complex. Through the establishment of new, modern power plant, the construction of high stacks, and the use of low-sulfur oil and sulfur-free natural gas, this source of SO2 emission was eliminated. Another SO2 source was the sulfuric acid production plant. By introducing the double contact process, the SO2 emissions were reduced almost by 90%. As a last measure, the numerous smaller SO2 emissions were attacked. The waste gas flows were united and cleaned in three large four-stage absorption plants. The air above the industrial complex is monitored by specially trained air spies. They control all operations and try to find disturbances which lead to emissions. With the aid of measuring units, the most important pollutants can be quantitatively determined. The air spies are connected with a mobile measuring station outside the plant premises which reports higher emissions. The work of the air spies is aided by emission measurements. The automatic analyzers used for this purpose are produced in a special department. The emission concentration of SO2 is now 0.12 mg/cu m air (annual average in 1970) in the center of the plant and 0.06 mg/cu m air 700 m distant from the plant.

12832 APTIC NO. 30876

Mikhaylenko, P. S.

THE AMMONIA METHOD OF SCRUBBING SULFUR COMPOUNDS FROM FLUE GASES. *Elek. St. (Moscow), vol. 24:20-24, July 1953. Translated from Russian by William C. Hunn, Tennessee Valley Authority Technical Library, Muscle Shoals, Ala., June 18, 1968.*

NTIS: PB 196771T

Operating data and design diagrams are presented for a pilot plant sulfur removal installation operating on the ammonia recycle method. The method is based on absorbing sulfur dioxide from flue gases with an ammonium sulfite-bisulfite solution. Production testing has shown that flue gases with a final sulfur dioxide content of 0.03% can be completely purified if the upper absorption section is irrigated with a solution of about S/C equals 0.76 (where S is total sulfur dioxide content and C the active ammonia content) and if the temperature of the incoming flue gas is about 30 C.

12833 APTIC NO. 30623

Mizobuchi, Izumi and Yu Watanabe

WASTE WATER PROCESSING APPARATUS BY THE USE OF ACIDIC FLUE GAS. *(Sansei haigasu ni yoru haisui shori sochi). Text in Japanese. (Hirakawa Steel Works (Japan)) Japan. Pat. Sho 46-8667. 3p. March 4, 1971. 2 refs. (Appl. Oct. 18, 1966, 2 claims).*

A device making use of acidic flue gas treats organic waste water or alkaline waste water. It is basically a vertical aeration tower with a flue gas intake duct opening in the lower part of the tower. The air nozzle, connected to the air blower by an air duct pipe, is located immediately above the gas intake duct. Directly, above the nozzle is a net screen with a mounted layer of iron scraps, permitting air or waste water to flow through easily. The waste water spray nozzle is above the layer of iron scraps and connected to the waste water tank by a pipe line equipped with a pump. Between the pump and the waste water tank is the auxiliary acid solution tank, connected to the waste water pipeline. The discharge port for the treated waste water is in the bottom of the tower; it is connected to the discharge pipeline, leading to a sedimentation tank and a reaction tank. The flue gas is admitted through the intake duct, and the air through the air nozzle. The waste water is pumped and fed in through the waste water spray nozzle. The alkaline or organic content of the waste water reacts with the acidic content of the flue gas such as sulfur trioxide or sulfur dioxide. The waste water, made neutral by the reaction, falls onto the loose layer of iron scraps where its excess, or residual acid, will be neutralized through a reaction with the iron scraps. The waste water is then discharged from the bottom of the tower and led to the sedimentation or reaction tank. When the feed-in volume of the flue gas or its acidic content becomes insufficient, the valve for the auxiliary acid solution tank is opened to supplement the needed acidic content. A waterdrop remover consisting of several corrugated plates assembled in a vertical position, is installed in the gas exhaust stack of the tower.

12834 APTIC NO. 30331

Moor, B. St. C.

NOTES ON AIR POLLUTION IN THE SUGAR INDUSTRY. *South African Sugar Technologists Assoc. Mount Edgecombe (Natal), Proc. South African Sugar Technologists Assoc., Annu. Congr., 44th, Mount Edgecombe, Natal, 1970, p. 54-56. (June 15-19.)*

In the sugar industry, air pollution is primarily associated with the fall-out of incompletely combusted particles (smuts) from bagasse-fired boilers. The remedy lies either in prevention, by avoiding the generation of smuts, or in cure, by removing generated smuts from gases before their release. Preventive measures include adequate furnace area, draft controls on the boiler, increased boiler capacity, and addition of air heaters to promote combustion of the relatively moist bagasse. Some success in removing smuts from flue gas has been achieved with water sprays in a smuts chamber and as the result of filtering flue gases through a mesh stainless steel vibrator. The filtering system virtually guarantees the dry removal of 99% by volume of all particles over 0.25 mm and a large proportion of all finer particles. Disadvantages of the system are its costs and increased I.D. fan power requirements.

12835 APTIC NO. 30607

Mueller, Gerhard F. and Wilhelm Jugel

TESTS ON FILTER CLOTHS PART I. *(Untersuchungen an Filtergeweben). Text in German. Chem. Tech. (Berlin), 23(4-5):243-249, April-May 1971. 24 refs.*

The structure of filter fabrics, pore size analysis, pore geometry, and determination of the fabric pore radius are discussed. The suitability of a fabric for purposes of filtration is largely given by its pore structure and distribution. Pore size distribution can be measured by mercury porosimeter which measures mercury penetration within a pore size range of 0.005 to 300 micron. The method is based on a balance of forces between surface tension and pressure in a capillary. When a polycapillary system is subjected to increasing Hg pressure, pores gradually fill up with Hg beginning with the largest and proceeding to the smallest with growing pressure. Pore distribution is calculated as a function of the volume of Hg which penetrates into the capillaries at different pressures. A modified porosimeter in which volume is measured by a tracer spindle has been developed to meet required criteria of accuracy. Pore distribution curves of most fabrics have a similar course. The peak represents the most frequently occurring fabric pore radius. The shape of pores does influence results of the Hg penetration method. The boiling test for the determination of pore radius is, like the Hg penetration test, based on the Laplace equation. In a reversal of the principle, excess pressure of a wetting liquid is required to displace liquid from pores. The narrowest cross section of the pore functions as the effective pore diameter. A polycapillary system filled with a liquid is exposed to increasing gas pressure, and the pore radius is calculated from the pressure flow curve obtained.

12836 APTIC NO. 30227

Muermann, Herbert

MAINTENANCE OF CLEAN AIR THROUGH WET DUST COLLECTORS. *(Luftreinhaltung durch Nassstaubabscheider). Text in German. Wasser, Luft, Betrieb, 15(5):165-176, May 1971. 4 refs.*

Wet dust collectors are equipped with or without nozzles for injection of the scrubbing fluid. Illustrations for each type and brief descriptions of various collectors are given. An example of the first type is the collector with a bank of spray nozzles in the first type is the collector with a bank of spray nozzles in the center. The dust-laden air enters tangentially at the lower section of the collector. In a typical dust collector without nozzles, the dust-laden air stream impacts on the surface of a water bath. A third group of wet collectors operate according to the venturi principle. Several versions of venturi scrubbers are available which differ in the method by which the scrubbing fluid enters. All venturi scrubbers have a pipe through which the gas flows axially. The pipe narrows toward the center and then widens. The collection efficiency of a wet collector is primarily determined by the pressure loss. For instance, in the case of a cascade scrubber 75% of the dust with a grain size of one micron is collected at a pressure loss of 150 mm water, and 95% at a pressure loss of 400 mm water. Wet collectors are primarily used for collection of dusts from coke, coal, lime, and stone sifting, crushing, and grinding stations.

12837 APTIC NO. 30401

Murata, Toshinori

PACKED-UP TYPE AIR FILTER DEVICE. *(Jutenshiki ea firuta sochi). Text in Japanese. (Hitachi Seisakusho K. K. (Japan)) Japan. Pat. Sho 46-12458. 2p., April 30, 1971. (Appl. Jan. 10, 1968, claims not given).*

An air filter packed with an active carbon adsorbent is widely used today. However, the active carbon or similar filter medium is likely to fall downward in the filter casing as a result of the vibration and shocks it is subjected to during installation or use. This leaves a vacant space in the upper section of the filter container. Therefore, polluted air passing through this vacant space is not filtered. A simple, yet effective, way to pack the filter medium in an air filter device so that such a vacant space is not formed and air taken into the air filter does not go out unfiltered is described. The interior of an air filter container is divided into several triangular compartments by a zig-zag shaped net or porous partition. The filter medium is contained in an oblong box. The front and rear sides of this box-like container are porous plates. Polluted air is taken in through the rear side, filtered by the filter medium packed in the box, and then discharged through the rear side, filtered by the filter medium packed in the box, and then discharged through the front side. A detachable cover is provided in the left side. The zig-zag shaped partition is inserted into the box from the left side, and then a filter medium, such as active carbon is inserted to fill each of the internal compartments formed by the partition. The filter medium is securely held in place in each small triangular compartment. Even if a small vacancy is formed in the upper corner of one triangular compartment, another compartment, on the other side of this compartment, has the filter medium in the portion that comes in the same height as that of the vacant corner, so that air does not go out unfiltered.

12838 APTIC NO. 30304

Muschelknautz, E. and W. Krambrock

AERODYNAMIC COEFFICIENTS OF THE CYCLONE SEPARATOR BASED ON NEW AND IMPROVED MEASUREMENTS. *(Aerodynamische Beiwerte des Zyklonabscheiders aufgrund neuer und verbesserter Messungen). Text in German. Chem. Ing. Tech., 42(5):247-255, March 1970. 10 refs. (Presented at the Arbeitssitzung des Gemeinschaftsausschusses Mehrphasenstroemungen der Verfahrenstechnischen Gesellschaft und der VDI-Fachgruppe Staubtechnik Bad Homburg, West Germany, April 25, 1969.)*

A cyclone consists of a cylindrical housing with a tangential entry pipe and an inner central pipe for outflow. For determination of a design with a view to obtaining optimum conditions of dust separation from an air stream, it is necessary to take into account various factors of friction, pressure drop, and turbulence. Experimental cyclone models of 100 mm diameter are described and illustrated which were operated by oil, water, or compressed air, and by means of which coefficients of wall friction and of pressure drops were determined from measurements of speeds and pressures, based on an evaluation of W. Barth's theory. The coefficients of wall friction are shown in a diagram in relation to a Reynolds number and the relative roughness of the wall. The pressure drop in the separating chamber calculated on the basis of these coefficients agreed very well with measured values. The coefficients of pressure drop at the inner outlet pipe were determined with greater accuracy than in previously made investigations, and are shown in the form of graphs in relation to the ratio of circumferential to axial velocity, whereby also the Reynolds number enters the relationship as a parameter. From measurements with very long cylindrical cyclone tubes, the maximum possible lengths of turbulence were determined and are shown graphically in dependence of the Reynolds number. The results obtained can be readily used for technical analysis of cyclone separators.

12839 APTIC NO. 30857

Myers, K. I.

EXPERIMENTAL EXTINGUISHMENT PROJECT NO. 67A-411OD, MARY-D BANK, TUSCARORA, PENNSYLVANIA. (FINAL REPORT). *Pennsylvania Dept. of Mines and Mineral Industries, Harrisburg, Proj. 67A-411OD, 22p., July 1969.*

The application of quarry waste to provide sealing-adherent protection against wind and water erosion and noxious fumes, when water stabilized on the surface was determined. The underlying dust was studied to see if it would retain its self-sealing characteristics, thereby contributing to the extinguishment of the fire in coal refuse banks. Clearing and grubbing of the vegetation around the entire toe of the bank to insure uninterrupted contact between the blanket material and the natural surface were completed. The quarry screening was placed on the top and side slopes of the bank in a balanket 24 in. deep. The material on the side slopes was dumped from the top and finegraded by two laborers using hand rakes. The quarry waste was dumped and spread on both the flattened top and graded side slopes of the bank without incident. Hydroseeding and tree planting were done to prevent erosion and possible reopening of the pile to air and subsequent reignition. The fire was brought under control by the application of quarry waste. Stabilization of the quarry waste by application of water to create a sealed crust, provided adherent protection against erosion while allowing the underlying dust to retain its self-sealing properties. The pile contained approximately 384,327 cu yd of material. The overall or unit cost of fire-control was about $0.44 per cu yd of cooled material. The elimination of the bank fire reduced a major source of pollutants and had a positive effect on atmospheric conditions in the area.

12840 APTIC NO. 30646

Nabeshima, Toshiro

ON MITSUBISHI-LURGI TYPE SLUDDGE TREATMENT METHOD. *(Mitsubishi- rurugi shiki odei shoriho ni tsuite). Text in Japanese. Nenryo Oyobi Nenyo (Fuel and Combustion), 38(4):357-362, April 1971.*

The dehydration of sludge is discussed, and the construction features of a Mitsubishi-Lurgi multi-stage sludge incinerator are presented. For incineration of dehydrated sludge by the Mitsubishi-Lurgi method, the sludge is carried over by a conveyor and fed into the furnace from above; it is then dried and incinerated while ash discharged from the furnace is carried by a conveyor to a hopper where it is stored. Exhaust gas from the furnace is sucked into a gas cleaner, then discharged through a chimney. The outer casing of the furnace is made of plated steel, heat-insulating, and fireproof materials. Fire grates, from five to twelve in number, are arranged in the furnace to be one above another. The upper grates serve as the drying stage, the middle grates as the incineration stage, and the lowest ones as the cooling stage. A heat-resistant steel shaft equipped with 2-4 arms per stage plunges vertically through the entire furnace. Each arm is equipped with a scrapper, which removes the sludge on the grate and feeds it to the lower grate or stage as the shaft revolves. The sludge moves downward with the revolutions of the shaft, drying as the combustion gas moves upward. The incinerator features rugged construction, an auxiliary combustion device, stable operation, and the ability to incinerate sludge together with other wastes such as garbage.

12841 APTIC NO. 30221

Nagayasu, Kenji

ON DESULFURIZATION OF CITY GAS. *(Toshi gasu no datsuryu ni tsuite) Text in Japanese. Nenryo Oyobi Nensyo (Fuel and Combustion), 38(1):12-25, Jan. 1971. 16 refs.*

Various methods available for the desulfurization of city gas, including expressions of their chemical reactions, are introduced. The dry desulfurization method, in which hydrogen sulfide is adsorbed by a powdered or granular adsorbent containing iron hydroxide and removed as iron sulfide, is discussed. The adsorbent for a box-type dry desulfurizer is a mixture of cast iron cutting scraps and rough sawdust mixed at volume ratio of one to five-ten. The mixture is spread, moistened with water, and exposed to sunlight to reduce the iron to iron oxide. This adsorbent, or desulfurizing agent, is spread 40-60 cm thick on each of a few hurdles fitted like a shelf in a square box about 1.3-1.5 m deep. The gas is fed in so as to flow through the adsorbent slowly at a velocity of 0.4 m/min. The characteristics of this method are H_2S is almost completely removed; daily operation and maintenance are simple; nitric oxide, dust, tar, and naphthalene contained in the gas can be removed at the same time; replacement and recovery require a lot of money and time; it requires a large site for installation; and disposal of the waste adsorbent is necessary. Introduced under the wet desulfurization process are: Seaboard Method, Thylox Method, Mitsubishi Kasei Method, Fumax Method, Takahax Method, G. Vetrocoke Method, Stretford Method, Girbotol Method, Alkacid Method, TPP Method, Collin Method, Vacuum Carbonate Method, and Hot Potassium Carbonate Method. They are classified into two groups, Equilibrium Process and Oxidation Process, and the basic mechanism and characteristics of each method are discussed. The Seaboard, Vacuum Carbonate, and Girbotol (or Girdler) methods, are included in the Equilibrium Process, while the rest are in the Oxidation Process. The factors requiring careful consideration when selecting a desulfurization system include: desulfurization cost, including construction cost, running cost, manpower required, and utilities; site area allowable; the form in which sulfur will be recovered; environmental pollution problems; and patents concerned with design and operation.

12842 APTIC NO. 30358

Nasu, Shigeharu, Satochi Yamada, and Masahiro Yamazaki

RAW MATERIAL PREHEATING/DRYING DEVICE ALSO SERVING AS EXHAUST GAS DUST REMOVER FOR SEALED TYPE ELECTRIC FURNACE. *(Haigasu kara funjin no jokyo o kaneta mippeigata denkiro ni okeru genryo no yonetsu kanso sochi). Text in Japanese. (Mizushima Gokin K. K. (Japan) Japan. Pat. Sho 45-31043. 4p., Oct. 7, 1970. 1 ref. (Appl. Oct. 5, 1967, 1 claim).*

A device, consisting of three sectoral-shaped vertical furnaces, installed above a sealed-type electric furnace and connected to the furnace by means of several feeder pipes is discussed. It is designed to effectively utilize the exhaust gas heat from the furnace for preheating and drying the material before it is fed into the furnace. At the same time it removes dust from the exhaust gas before it is discharged into the atmosphere. The three sectoral furnaces are installed to surround the three electrode rods located at the three vertexes of an assumed equilateral triangle. In a cross-sectional view, the sectoral furnace is arch-shaped. The top of each sectoral furnace is connected to the material feeder shoot, while its bottom has feeder pipes that plunge into the electric furnace. A feeder pipe also extends downward from each side of the sectoral furnace. The nearest two of these side feeder pipes meet at a relay pipe leading to the large center feeder pipe. Therefore, there are three relay pipes which connect six side feeder pipes to the large center feeder pipe, which also plunges into the electric furnace. Each sectoral furnace has a built-in electromagnetic or roller-type feeder device. The exhaust gas discharge port is in the upper side of the sectoral furnace. The sectoral furnace is about one meter high, and the width between the inner wall and the outer wall is set at about 0.6 m. The exhaust gas discharge duct, connected to the discharge port, is equipped with a suction pump. Carbon monoxide, produced in the electric furnace, is further burned with air or oxygen-enriched air fed in through the vents of the electric furnace. The high-temperature gas, produced by this secondary combustion, flows upward through the feeder pipes at a velocity of 0.6 m/sec, as adjusted by the suction pump. This gas effectively preheats and dries the raw material in the sectoral furnace, after which the gas is discharged through the discharge duct. The 0.6 m width is selected to assure that the outer and inner layers of the raw material are uniformly preheated and dried; the one meter height is experimentally selected as the maximum height that does not adversely affect the gas flow through the grains of material. The flow speed of gas is set at 0.6 m/sec because it is best suited for the removal of dust from the exhaust gas within an allowable economical range of the flow speed.

12843 APTIC NO. 30466

Naumann, Robert J. and David Jex

LIQUID AEROSOL DISPENSER. *(National Aeronautics and Space Administration, Huntsville, Ala., George C. Marshall Space Flight Center) U. S. Pat. Appl. 61,894. 8p., Aug. 7, 1970. (claims not given).*

NTIS: N70-41977

A liquid aerosol dispenser is discussed having an explosively driven piston that compresses a light gas to an extremely high pressure so that a liquid aerosol is dispensed by the rupturing of a first seal to allow the compressed gas to mix with the liquid. This invention is particularly adapted for use in dispensing quenching agents to stop the propagation of explosives in coal mines or other confined areas. Other apparatuses having quick ejection qualities have problems providing a strong enough seal to prevent undesired preopening, while providing sufficient pressure to cause the cover to open at the discharge. Therefore, the invention was developed to quickly dispense liquid aerosols, and also provide a refillable dispenser in which no hazards occur from fragments of the container. Upon detonation of the propellent, the piston is driven into the compression tube and the gas is compressed. Then the piston extrudes into the tapered bore and causes a diaphragm to rupture and allow the gas to expand into the bore. There it mixes with the liquid. Then an adhesively applied plastic sheet ruptures, and the aerosol is emitted.

12844 APTIC NO. 30384

Noelen, G. T. M.

HIGH QUALITY CASTINGS PROMOTE DEVELOPMENT OF THE STIRLING ENGINE. *(Feinguss foerdert die Entwicklung des Stirlingmotors). Text in German. Giesserei (Duesseldorf), 58(7):166-170, April 1971. 6 refs. (Presented at the Kongress der Europaeischen Feingiesser, 14th, Zurich, Switzerland, Oct. 4-7, 1970.)*

The advantages of the Stirling engine are smooth operation, noiselessness, and low concentration of toxicants in the exhaust gases. In addition, the Stirling motor has a good thermal efficiency, no lubricant consumption, favorable torque characteristics, high reliability, and low maintenance costs. Like Otto and diesel engines, the Stirling motor uses a piston. The gas is heated by an external combustion process: the heat is passed through a wall to the gas and carried off again through a wall. The upper section of the Stirling engine consists almost entirely of stainless steel. All heat exchangers are arranged outside the engine cylinders. The cylinder and the heat exchanger contain a certain quantity of gas for a certain engine torque. The internal pressure changes between 140 and 170 bar according to a sinus curve. A temperature between 700 and 800 C is maintained in the heater. Almost all components of the heater head are exposed to temperature gradients which cause heat tensions at each change of the engine cycle. Creep-resisting alloys cast according to the wax-melting process (high-quality casting) are to be used for the engine. This technique permits manufacture of tight pressure vessels which can be exposed in part to high temperatures. By the use of such alloys, the specific power of the engine can be increased and the costs decreased.

12845 APTIC NO. 30606

Nietzold, Ingo

STATUS AND TENDENCIES OF AIR FILTRATION IN THE G.D.R. *(Stand und Tendenzen der Luftfiltration in der DDR). Text in German. Chem. Tech. (Berlin), 23(4-5):238-243, April-May, 1971. (Presented at the Colloquium Reinhaltung der Luft, 11th Woche der Kammer der Technik, VEB Chemiefaserkombinat Wilhelm Pieck Schwarza, Oct. 27, 1970.)*

Third generation dust filters (1965-1975) for compact continuous filtration, filter housings with removable filter panels for 500 to 20,000 cu m air/hr, classification of filters by their performance, the systems concept of air filtration, the trends discernible in filter development, electrofilters, and the filter supply situation and their importation into East Germany are reviewed. Third generation dust filters have a frame size of 710 by 460 mm, process 30.0 cu m air/hr which corresponds to a flow velocity of 2.55 m/sec. Filter assemblies come in 24 sizes with the largest having a capacity of 420 000 cu m air/hr. The filtering material consists of a fleece of polyester and polyamide fibers lined by malimo gauze tighly stretched over rollers in several folds within the filter frame. Dust-laden filter material, replaced by fresh fleece by winding a roller, is descarded. Aerosol filters are currently being officially tested by means of radioactively marked aerosols. The AFI code is not used in the G.D.R. A new system is proposed which classifies filters by their separation power of silica dust, oil fog, and radioactively marked aerosols and stipulates the test procedure to be used in each case. The trend is away from reusable towards disposable filters, even though the cost is higher. Electrofilter production and use has declined because of their frequent malfunctions, even though their usefulness in fine dust removal is generally recognized. The importation of foreign, even of superior filters is being discouraged.

12846 APTIC NO. 30211

Nomura, Tsutomu, Shigeyuki Noso, and Nariaki Mitsuzaki

VENTURI SCRUBBER. *(Benchuri skuraba). Text in Japanese. (Sumitomo Jukikai Kogyo K. K. (Japan)) Japan. Pat. Sho 46-18071. 4p., May 20, 1971. (Appl. April 30, 1968, 1 claim).*

A conventional venturi scrubber has a moving block provided at its throat so that the sectional area of the throat opening may be adjusted according to the flow quantity of the gas. This keeps the pressure or flow velocity of the gas constant. The moving block moves at 100 mm/min when operated manually, or at 200 mm/min when driven by a motor; the speed is too slow to respond quickly to the varying flow speed of the gas. It has been discovered that the pressure loss at the throat, caused by a decrease in the flow quantity of the gas, can be remedied by increasing the amount of water jetted into the throat. However, the pressure loss adjustment by the water injection method is effective only when the flow quantity of the gas fluctuates within the 70-110% range from the initial or standard flow quantity of the gas, taken as 100%. In view of this, the new venturi scrubber is equipped with both the moving block type pressure adjuster and water injection type pressure adjuster, the former automatically activated to function when the pressure drops to less than 70% of the initial 100%. For automatic control of the latter, a pressure differential detector, which detects the pressure difference between the entrance and exit of the scrubber, is provided. This detector transmits an electric signal, via an electropneumatic converter, to the pump that feeds water to be jetted into the throat. The electropneumatic converter converts the electric signal to a pneumatic signal which will be conveyed to the pump. For automatic control of the moving block, a flowmeter, interlocked with the electromagnetic switch of the motor operating the block, is provided. Both automatic control mechanisms for the moving block and water injection adjusters are interlocked with each other. When the flow quantity of the gas decreases to less than 70% of the initial quantity, the electromagnetic switch interlocked with the flow meter closes to activate the motor, thereby driving the moving block to narrow the throat opening. When the throat opening is narrowed to about 60% of the initial opening, the motor is automatically stopped. Then, the water injection type adjuster functions, in that the 60% opening of the throat is now taken as 100%. When the gas quantity increases to 116% or more under this setting, that is, 70% or more compared with the initial quantity taken as 100%, the motor is again activated to move the moving block to widen the throat opening. The motor automatically stops when the opening reaches 100%.

12847 APTIC NO. 30259

Nonaka, Yoshihiro, Akio Ono, Tetsuo Yoshida, and Yasuo Sakisaka

A CONSIDERATION OF OPTIMUM DESIGN OF VENTURI SCRUBBER. *(Benchuri sukuraba no saiteki sekkei ni kansuru ichi kosatsu). Text in Japanese. Preprint, Japan Society of Chemical Engineers, Tokyo, 5 refs. (Presented at the Japan Society of Chemical Engineers, Autumn Con-*

ference, 4th, Hiroshima, Japan, Oct. 6-8, 1970, Paper F114.)

How the relation between power and collection efficiency changes with operational conditions and shapes of venturi scrubbers was investigated by a pressure loss equation and an equation of collection efficiency for the case that collision collection by inertia is dominant. In calculating the pressure loss equation, an equation of particle drag coefficient of a particle, which is applicable both in Stokes and Allen ranges, was used to solve the equation of motion of liquid drop. An approximate equation of target efficiency was adopted in the collection efficiency equation. The following assumptions were adopted in the collection efficiency equation: The dust is hydrophilic, the liquid drops are well dispersed, the collision of liquid drops is not considered; the liquid fraction is calculated on the effectively dispersed quantity; and adequate values are adopted of the shape of scrubber, coefficient of friction, viscosity, density of gas and liquid, and liquid drop diameter. Under the above conditions, the relations between collecting efficiency and pressure loss were calculated by computer for various throat lengths, gas flow rates at the throat, liquid fractions, and dust diameters. An example of the results is shown. Setting aside the absolute values of collection efficiency, the effects of liquid fraction and flow rate at the throat were similar to those observed by Ekman. The effect of throat length proved to be rather large. The collection efficiency divided by pressure loss is considered to be a criterion showing the optimum conditions from the standpoint of power. But the value decreases relatively as collection efficiency increases, and for the design of one-stage venturi, the normal expression seems to be better.

12848 APTIC NO. 30902

Norden, H.

LARGE BOILER FURNACES. MAXIMUM CAPACITY AND SAFETY OF OPERATION.

(Grosskesselfeuerungen. Maximale Leistung und Betriebssicherheit). Text in German. Oel Gasfeuerung, 16(6):608-614, June 1971.

Boiler furnace problems are discussed which are fired by fuel oil and which produce more than 100 t/hr of steam. Despite extensive practical experience with oil-fired furnaces, modifications of the furnaces become necessary after they are put into operation. This is due to the changing quality of fuel oil. The furnace design, primarily the burner arrangement, must be such that sufficient residence time is allowed for oil products or components that are difficult to burn (carbon-carbon monoxide-carbon dioxide, sulfur, sulfur dioxide- sulfur trioxide) in an oxygen-containing atmosphere. The residence time necessary for complete combustion can be achieved by downward tilting of the burners. Through this measure, the combustible products are rotated long enough so that they are completely burned. Arranging burners so that flames do not interfere with each other also promotes complete combustion, but requires a wider combustion chamber. It is important, that burners installed close to a wall burn without touching the wall. Any contact with the wall causes a lack of air supply with reducing atmospheric conditions. If the fuel/air mixture contains strands of too much air or lack of air, SO_3 and soot are formed. Soot decomposes with sufficient residence time, but the SO_3 cannot be reduced.

12849 APTIC NO. 30210

Noso, Shigeyuki and Takeshi Hirao

AUTOMATIC CONTROL DEVICE FOR 2-STAGE VENTURI SCRUBBER.

(2dan benchuri sukuraba no jidoseigyo sochi). Text in Japanese. (Sumitomo Jukikai Kogyo K. K. (Japan)) Japan. Pat. Sho 46-18072. 5p., May 20, 1971. (Appl. July 29, 1968, 1 claim).

A two-stage venturi scrubber, consisting of two venturi scrubbers connected in series to each other is described. Each component scrubber is equipped with an automatic throat pressure adjuster device consisting of the moving block type throat pressure adjuster and water injection type throat pressure adjuster. They are designed to adjust the flow pressure at the throat of the scrubber according to the flow quantity of the gas, which varies from time to time. The throat pressure adjuster devices for the two component scrubbers may be controlled by the same or separate automatic control devices. When the flow quantity of the gas is fluctuating within the 70-110% range as compared with the initial flow quantity, taken as 100%, the water injection type adjuster is activated to function for the pressure loss adjustment. When the flow quantity decreases to less than 70% of the initial flow quantity, the moving block type adjuster is automatically activated to narrow the throat opening up to 60% of the initial throat opening. With the 60% throat opening taken as 100%, the water injection type adjuster functions within the 70-100% range, which is equivalent to 49-66% of the initial flow quantity. As the flow quantity increases to 116% or higher (70% or higher compared with the initial quantity) under this setting, the motor that drives the moving block becomes activated to widen the throat opening, whereupon the motor automatically stops. The water injection type adjuster now functions, based on the initial flow quantity taken as 100%. The pressure loss ratio between the two scrubbers should be 1 to 1-2 for the efficient dust removal by a two-stage scrubber. The total pressure loss for the entire 2- stage scrubber should remain constant. Therefore, the initial reference pressure level for the first and second scrubbers should be set to meet this ratio.

12850 APTIC NO. 30335

Obr, J.

TODAY S STATE OF DEDUSTING EQUIPMENT AT CEMENT AND LIME WORKS.

(Soucasny stav odlucovacich zarizeni v cementarnach a vapenkach). Text in Czech. Stavivo, 49(5):5-7, 1971. (Presented at the Conference on Protection of the Atmosphere Cleanliness at the Cement, Lime, and Ceramic Industries, Prague, Czechoslovakia, Nov. 12-13, 1970.)

The status of dedusting equipment in Czechoslovakian cement and lime works is reviewed. Operating failures of electrostatic precipitators at one cement plant and of FIA filters at another are analyzed. A Five Year Plan for achieving clean air is presented.

12851 APTIC NO. 30371

Ochs, Hans-Joachim

ELECTROSTATIC PRECIPITATORS FOR FINE DUST COLLECTION.

(Elektro-Luftfilter zur Luftfeinreinigung). Text in German. Wasser Luft Betrieb, 15(6):220-223, June 1971. 2 refs.

Electrostatic precipitators operated on the Penney system require relatively low dc voltages, charge the entering air positively, and produce ozone quantities of only 50 mg/cu m. Cleaning the dust-laden air is achieved in two zones. The ionization zone, with tungsten wires as ionizing electrodes, is supplied by a dc voltage of 13,000 volts. The collection zone consists of grounded collection plates made of aluminum. The flow speed of the dust-laden air should not exceed 2.4 m/sec so that particles with a grain size between 40 and 60 micron can be collected. The collection efficiency in each individual case can be calculated with the formula by Deutsch. When a dust layer of 2 mm has accumulated, the precipitator must be cleaned; nozzles are usually installed for this purpose which inject washing water with a pressure of 2.5 atm gauge; warm water with maximum temperature of 60 C is preferred. Washing normally takes 3 to 5 min. Afterwards, the washed collection plates must be dried which takes from 30 min to several hours. The drying time may be shortened by switching on the ventilator. With a careful maintenance service of the precipitator, its life-time is a long one. The cost of operation and maintenance is low so that the investment costs are justified.

12852 APTIC NO. 30155

Olds, F. C.

PROGRESS AND PROGRAMS IN AIR POLLUTION ABATEMENT. *Power Eng., 75(6):54-56, June 1971.*

Several examples are cited to illustrate the scope and variety of air pollution research programs conducted by the Division of Control Systems of the Office of Air Programs. These research programs relate to improved techniques for reducing pollution from stationary sources, and are directed toward the removal of pollutants from fuels before burning, control of combustion processes to minimize emissions, or cleaning of the discharged gases. Fluid bed combustion is a major DCS effort because of the high potential the removal of sulfur oxides builds into an economic system. Three systems are under investigation for sulfur and nitrogen oxides control. One is for a utility boiler at atmospheric pressure, a second for a boiler under pressure, and a third is an acceptor-fluidized bed to produce gas with combustion in a second stage. In another important, seven million dollar study underway at a power plant, a comparison is being made between wet (scrubbers) and dry (limestone injection) sulfur dioxide removal systems. DCS is also addressing itself to origin of submicron matter and the kinetics of its generation. Both the measurement and removal of these very small particles require new technology and equipment.

12853 APTIC NO. 30314

Pennachetti, John T. and Joseph F. Boux

RECOVERING POZZOLANIC MATERIAL, A CARBON CONCENTRATE, AN IRON CONCENTRATE AND SINTERED AGGREGATE FROM FLY ASH. *(Assignee not given.) U. S. Pat. 3,564,084. 4p., Feb. 16, 1971. 7 refs. (Appl. Dec. 4, 1967, 7 claims).*

The process described permits economic utilization of the total fly ash produced from coal combustion by forming four valuable products: an improved pozzolan product, a carbon concentrate, an iron concentrate, and an agglomerate. The process subjects fly ash to a magnetic separation to remove the iron concentrate product. The remainder is then air classified to remove a fine pozzolanic material with at least 85% of the particles being minus 325 mesh. The remaining heavy ends are dry screened over a 100-150 mesh screen to remove a coarse product containing at least 25% carbon. The size of the dry screen maintains the carbon content of the -100 to -150 mesh sinter fraction at 5-8%. The sinter fraction, if necessary, is blended with sufficient pozzolanic material to reduce the iron content to below 10%, pelletized, and sintered at 1900-2800 F. (Author abstract modified)

12854 APTIC NO. 30611

Peters W., H. Juentgen, and E. Ahland

MODERN DEVELOPMENTS FOR COKE PRODUCTION FOR OLD AND NEW FIELDS OF APPLICATION. *(Moderne Verfahrensentwicklungen zur Kokserzeugung fuer alte und neue Anwendungsgebiete). Text in German. Brennstoff-Waerme-Kraft, 23(6):281-285, June 1971. 14 refs. (Presented at the Weltenergiekonferenz, 8th, Bucharest, Romania, 1971, Paper 2.3-97.)*

One of the most important fields of applications for formed coke is the desulfurization of waste gases. Recent research led to a new desulfurization process based on the use of activated coke. The basic principle of this method is the adsorption of the sulfur dioxide on the activated coke, where it is converted to sulfuric acid through the presence of water vapor and oxygen. The activated coke, laden with sulfuric acid, is regenerated through thermal treatment or by scrubbing. In the first case, the sulfuric acid is reduced to SO2; in the second case, diluted sulfuric acid is formed. Two different types of activated coke have been developed to suit the two methods of regeneration. For thermal regeneration, the loaded coke is contacted with hot sand in an inert atmosphere. Through sifting, the sand is separated from the coke and the latter is returned to the reactor. Regeneration through scrubbing is the simpler method. The sulfuric acid is washed by a countercurrent water flow. Water consumption is low. With the aid of a sifter, the water is separated from the coke. The coke is returned to the reactor without drying.

12855 APTIC NO. 30856

Putnam, Robert C.

INVESTIGATION OF THE NECESSARY CONDITIONS FOR PROPER DECONTAMINATION AND COMBUSTION OF ORGANIC PESTICIDE CONTAINERS. *Dept. of Agriculture, Washington, D. C., Working Group on Pesticides, Proc. Natl. Working Conf. Pesticide Disposal, Beltsville, Md., 1970, p. 108-119. (June 30-July 1.)*

NTIS: PB 197145

Methods of combustion applicable to pesticide residues and their containers were investigated, and a means for their destruction which would keep environmental pollution to a minimum was devised. Initial pyrolysis experiments were carried out using a pyrolyzer attached to a gas chromotograph. Various pesticides including DDT and Malathion were studied. Data showed that as the temperature was elevated, the ratio of pesticide to decomposition products found in the vapor decreased. A differential scanning calorimeter (DSC) was used to measure the heat emitted or absorbed as the temperature of a pesticide was raised. It could be operated with an open or closed container. With the use of potassium chlorate, it was found that the major decomposition in all cases occurred below 360 C. A series of binders were investigated to retard vaporization and promote decomposition of the pesticide. They were studied by a DSC. Mineral oil was found to give a large exothermic response with potassium chlorate and the pesticide. A series of oxidants was then studied with mineral oil, but potassium chlorate was found to be the most effective. By using polyethylene, which under heating or combustion conditions softens or degrades to products of lower molecular weight, the advantages of a liner and a binder were obtained with one material. A practical system was devised which consisted of burning the pesticide in a flattened polyethylene bag on or surrounded by other combustible material.

12856 APTIC NO. 30599

Raskin, A. Ya., Yu. A. Sokolinsky, and V. I. Mukosey

DETERMINATION OF THE OPTIMAL STEAM:GAS RATIO IN THE CONVERSION OF CARBON MONOXIDE. *(Opredeleniye optimal nogo sootnosheniya par:gaz v protsesse konversii okisi ugleroda). Text in Russian. Khim. Prom. (Moscow), no. 4:311, 1971. 3 refs.*

The kinetics of the conversion of carbon monoxide to carbon dioxide by steam was analyzed. An optimum steam:gas ratio (gamma) was derived from the condition of maximum reaction rate which depended on composition of dry gas and on temperature. In a 2-stage industrial convertor, gamma has to be higher in the second stage than in the first. Economic aspects of the process require such as steam:gas ratio that the difference in cost of hydrogen obtained and steam used is maximum and that the degree of purification of gas from CO is not lower than the required limit. The optimalization of the process on the basis of economic aspects yielded economic gamma, which was considerably lower than kinetic gamma. Variation of gamma in accessible limits does not lead to soot formation.

12857 APTIC NO. 30458

Ruth, Lawrence A., Arthur M. Squires, and Robert A. Graff

DESULFURIZATION OF FUELS WITH CALCINED DOLOMITE: III. FIRST RESULTS FOR REACTION OF CAC03 WITH H2S. *Preprint, American Chemical Society, Washington D. C., 26p., 1971. 8 refs. (Presented at the American Chemical Society Meeting, Los Angeles, Calif., March 31, 1971.)*

Differential kinetic data are given for the reaction of half- calcined dolomite (calcium magnesium carbonate) with hydrogen sulfide between 550 and 800 C at H2S partial pressures between 0.005 and 0.2 atm and over a wide range of carbon dioxide partial pressures. This reaction was studied with a thermogravimetric analyzer. At lower temperatures, the reaction was hindered by the activated adsorption of H2S; this effect was cancelled when a higher partial pressure of CO2 was imposed. At higher temperatures, and at lower temperatures if the partial pressure of CO2 is relatively large, the reaction of half-calcined dolomite with H2S was faster than the reaction of fully calcined dolomite. The good reactivity of half-calcined dolomite makes it attractive for use in a panel bed filter which removes dust and sulfur from fuel gas produced by gasifying coal or oil at high pressures. An illustrative process is described in which the cleaned fuel gas is used to generate electricity by a combination of gas and steam turbines. (Author abstract modified)

12858 APTIC NO. 30348

Safford, Donald E.

HIGHER PREHAT EQUALS LOWER COST, CLEAN AIR. *Natl. Eng., 74(4): 10-12, April 1970. 2 refs.*

Factors which are critical for clean combustion of residual fuels include good air-fuel mixing, fuel velocity at the burner, the ability of the burner to hold the flame in a stable position, flame consolidation, and sufficient flame travel before touching a relatively cool surface or atmosphere. Droplet size is important, since the droplet must vaporize before the fuel will burn. A desirable viscosity at the burner is certainly no more than 150 SSU. Preheat temperatures for No. 6 fuel to obtain a low viscosity at the burner will range from 250 to 270 F. An added benefit of higher preheat is the shortening of the flame. Pulsation is caused by fine droplets being blown away from the atomizer by either primary or secondary air streams. The droplets ignite some distance downstream from the nozzle, and, in turn, ignite droplets closer to the nozzle. The flame front then is not stable. The use of flame-holders or stabilizing devices located in the proximity of the burner nozzle can cure this pulsation. Other methods of flame stabilizing are noted. A more precise measurement of combustion quality than the Ringelmann chart is the Bacharach smoke scale.

12859 APTIC NO. 30215

Sato, Seigoro

DEVICE TO AFTER-BURN AND DISCHARGE EXHAUST GAS. *(Haikigasu nensho hoshutsuki). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 46-11608. 2p., April 22, 1971. 2 refs. (Appl. Dec. 2, 1966, claims not given).*

A device to induce the after-burning of automotive exhaust gas is described. It is installed between the first muffler, if there are two or more mufflers, and the exhaust pipe following the first muffler. It is shaped like an inverted cone or, more properly, an apple. The upper and lower halves of this apple-like casing are made separately and put together securely by welding. The center of the bottom is projected slightly upward and provided with an air intake port, while the center of the tope side is similarily curved or projected inward to form a cavity in which the discharge port, connected to a discharge pipe, is provided. The exhaust pipe from the muffler is connected to the side of the upper half in such a way that the exhaust pipe may open in the tangential direction along the inner wall of the device. As the exhaust gas is taken into the device through the exhaust pipe from the muffler, it hits the inner wall and moves along it. The pulsating exhaust gas that follows causes the gas in the device to move in a whirlpool-like manner. During this process, recombustion of the exhaust gas occurs, burning the sulfur dioxide contained in the exhaust gas. During or after the recombustion, the gas moves downward, turning as it is pushed by the pressure of the following exhaust gas, and its temperature drops. This vortex flow of the gas forms a negative pressure zone along the vertical center line, so that outside air is sucked in through the air intake port. The air flows upward along the negative pressure zone, taking with it the precipitating gas, which now contains very little SO2, to the discharge port of the device.

12860 APTIC NO. 30782

Shibahara, Toshio

ASSEMBLY OF FILTER ELEMENTS FOR AIR CLEANER. *(Kuki seijoki no firuta so). Text in Japanese. (Matsushita Seiko K.K. (Japan)) Japan. Pat. Sho 46-12463. 2p., April 30, 1971. (Appl. March 14, 1968, claims not given).*

An air cleaner is equipped with a filter unit consisting of several filter layers: pre-filter, deodorizing filter, rear filter, and high-performance filter. These filter layers are installed separately in the cabinet of the air cleaner. Since the internal space of the cabinet is limited, to install them separately is difficult, time-consuming and requires more space for the installation. A method for installing the filters as one block is described. The filter elements are placed in the following order, from bottom to top: prefilter, deodorizing filter, rear filter, and high-performance filter. An L-shaped frame is fitted to the right end of the prefilter and the rear filter. The right end of the deodorizing filter is trimmed by a U-shaped frame. The high-performance filter is not trimmed by a frame. The upper two filters are shorter than the lower two, leaving an oblong space above the extra portion of the lower two filters.

A block-like supporting frame for the upper two filters fills this space. A large U-shaped frame is mounted to hold all four filters and the supporting frame in place. The large U-shaped frame is mounted in such a way that its lower bent edge goes under the bottom of the right-end portion of the prefilter, while its upper bent edge goes to the top side of the supporting frame. The large U-shaped frame can slide sideways. It has a slit whose right side is open so that it may become engaged with a tightening bolt when the frame is slid to the right. The bolt is a butterfly type, and plunges through the supporting frame into the right end of the rear filter. Since the L-shaped frame fitted to the rear filter has a screw hole, the butterfly bolt can be screwed to hold the entire assembly tightly in place.

12861 APTIC NO. 30783

Shinobiashi, Yoshimi

PACKING FOR MOUNTING AIR FILTER. *(Kuki rokaki no toritsukeyo pakkingu). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 46-12461. 2p., April 30, 1971. (Appl. Feb. 5, 1968, claims not given).*

An innovation of the packing used for the air-tight mounting of an air filter is described. In a high-performance air filter, several zig-zag shaped filter papers are fitted onto, and held in place by, a frame made of plywood or metal plate. When fitting this filter frame to the supporting frame by bolts and nuts, a rubber packing is inserted between the filter frame and the supporting frame. When tightened to such an extent that the packing may be pressed to half its original thickness, the optimum air-tightness is usually indicated. However, since several air filters are usually assembled into one unit, and the air filter unit comes in a box-like casing, it is not easy to see whether or not each filter frame has been tightened to the optimum degree. If not tightened sufficiently, air will leak through the gap of the packing. If tightened excessively, the packing will deteriorate. The new packing designed for this use automatically assures the optimum tightening. It has several holes; each hole is filled with a tightening regulator that is half as thick as the packing. The tightening regulator is made of hard material which will not contract when pressed by the tightening bolt. When the filter frame is tightened for air-tight mounting, the packing allows the tightening only up to the regulator. When it has been tigtened to such a degree that the packing is pressed to half its original thickness, the regulator stops further tightening.

12862 APTIC NO. 30862

Stern, Arthur C.

EFFICIENCY, APPLICATION, AND SELECTION OF COLLECTORS. *In: Air Pollution. Arthur C. Stern (ed.), Vol. 3, 2nd ed., New York, Academic Press, 1968, Chapt. 42, p. 319-358. 9 refs.*

Control equipment may be classified into several general types: filters, electrical precipitators, cyclones, mechanical collectors, scrubbers, adsorbers, and equipment in which the contaminant is burned as the means for its control. This latter category includes afterburners, catalytic combustion, and similar apparatus. Equipment of different types are frequently used in series and sometimes incorporated into the same housing. Collector selection involves two basic steps: first, the choice from among all collector types of those which will meet the technical requirements of the process; and second, the choice from among those meeting the requirements, of the type which will do the job at lowest overall cost. The technical requirements are set forth in terms of the carrier gas and the contaminants it carries. It is necessary to know the physical and chemical properties of the carrier gas, its rate of flow, and variations of these properties with changes in both rate of flow and time. Gas composition, temperature, pressure, viscosity, density, humidity, combustibility, reactivity, toxicity, and electrical and sonic properties of the carrier gas are important. The physical and chemical properties of the contaminants must also be known, as well as their concentration or loading in the carrier gas and variations in both loading and properties with flow rate and with time. Solubility, sorbability, combustibility, reactivity, electrical and sonic properties, toxicity, contaminant size, shape, and density, hygroscopicity, agglomerating characteristics, flow properties, and catalyst poisoning are important variables. Efficiency of collectors is discussed, inlcuding fractional efficiency, penetration, the decontamination factor and the decontamination index. Efficiencies based upon particle count or soiling index are considered. The effect of nonisokinetic sampling is discussed, as well as other sources of erroneous efficiency test results, the effect of particle size analysis techniques, inlet loading, guaranteed efficiency, and temperature reduction of influent gases.

12863 APTIC NO. 30201

Stine, L. O., R. M. De Veirman, and R. P. Schuller

MANUFACTURING TOMORROW S GASOLINES. *Oil Gas J., 69(23):76-86, June 7, 1971.*

Anticipating the forthcoming changes in gasoline, Universal Oil Products has been investigating novel techniques which would allow the production of tomorrow s gasolines at lower cost. Objectives are to reduce the yield losses associated with the aromatic approach by selectively upgrading the lower-octane components rather than by overcoming their deficiencies by increasing the concentration of aromatics. This route can be described by the following: carbon 7 plus paraffins to yield high-octane C7 plus paraffins. The case of a typical moderately naphthenic naphtha is considered. If it is assumed that the native aromatics can be retained and that the naphthenes can be converted stoichiometrically to aromatics, both reasonably good approximations, there are only the paraffins left to consider. A reexamination of the octane table by carbon number and hydrocarbon types indicates that there are paraffins of similar boiling range that have high octane numbers; i.e., alkylate. If it is assumed that, by some magic, the C7 plus paraffins in the naphtha can be converted to alkylate, a favorable octane number and yield will be achieved. Olefin production, isobutane production, and alkylation are discussed. Case studies and their economics are presented.

12864 APTIC NO. 30415

Struck, Robert T., Metro D. Kulik, and Everett Gorin

REMOVAL OF SULFUR DIOXIDE FROM STACK GASES BY A MODIFIED CLAUS PROCESS. *Environ. Sci. Technol., 5(7):626-630, July 1971. 11 refs. (Presented at the American Chemical Society, Division of Fuel Chemistry, National Meeting, 158th, New York, Sept. 7-12, 1969.)*

The results of a bench-scale study on the potential application of a low-temperature Claus process to the treatment of dilute sulfur dioxide-containing stack gases are presented. Optimum results are obtained at a temperature of about 100 C. Under these conditions, the sulfur formed quantitatively condenses on the catalyst and the product gas contains less than 500 ppm of sulfur compounds. Data are given for a two-stage regeneration process which eliminates catalyst poisoning caused by sulfate formation. Of the sulfur recovered, 93% is elemental sulfur; the rest is ammonium sulfate. These results were obtained with a synthetic flue gas having the same composition as a power-plant stack gas, with the exception that nitric oxide plus nitrogen dioxide were absent. The presence of NOx accelerates poisoning of the catalyst, but the above two-stage regeneration procedure is still effective for reactivating the catalyst. (Author abstract)

12865 **APTIC NO. 30176**

Sturles, Franz

WASTE AIR FROM LACQUER PROCESSING. PROBLEMS OF CATALYTIC AND THERMAL AFTERBURNING. *(Abluft bei der Lackverarbeitung. Probleme der katalytischen und thermischen Nachverbrennung). Text in German. VDI (Ver. Deut. Ingr.) Nachr. (Berlin), 25(22):19, June 2, 1971.*

Cleaned waste gases of lacquer-processing plants may not contain more than 300 mg/cu m carbon in the combustible organic matter. There is scarcely any knowledge about the composition of waste gas emitted from drying furnaces. The sensitivity of available test tubes is below the odor threshold, but they are suitable only for measurements between 0 and 40 C. To achieve the necessary cooling of gases with temperatures of 300 C and more, copper tubes 600-mm long can be used. These tubes are 5-mm in diameter and have a wall thickness of 1 mm. Such waste gases can be cleaned by catalytic combustion between 300 and 500 C and thermal afterburning between 500 and 900 C. Experiments show that at a waste gas carbon content of 500-700 mg/cu m, thermal combustion with efficiency of 60-70% is sufficient. If the carbon content of the waste gas is between 2700-3000 mg/cu m, a combination of thermal and catalytic afterburning is preferable. In cases where the catalysts are rapidly contaminated by phosphorus compounds contained in the lacquers, thermal afterburning must be used. Installation costs for a combined thermal catalytic/afterburning system range from $8400-9800.

12866 **APTIC NO. 30243**

Swift, Peter

PROBLEMS IN THE CONTINUOUS FILTRATION OF AIRBORNE DUSTS. *Filtration Separation (Purley), 8(3):295-301, May/June 1971. (Presented at the Filtration Society, London, Nov. 3, 1970.)*

The general principles of continuous fabric filtration of dusts and the equipment used are discussed. Several problems of plant breakdown and malfunction and how they were rectified are presented. The problems involved dust burdens, severity of operation and maintenance, size distribution and felt binding, contamination of the product, design defect, and faulty collection points. The problem of dust burden can be offset by increasing the frequency of the jet cleaning operation to a point where cleaning of an individual element is less than 60 seconds. Continuous operation generally means eight hours of uninterrupted operation, or five days at the most. Therefore, opportunities for inspection and maintenance are reasonably frequent. In cases where this does not apply, an examination of the process, probable effect on the filter, and planned maintenance requirements and abilities are essential. To maintain constant conditions of air flow/resistance, thinner felts of the order of 9.5 oz/sq yd are used; these give a lower eventual resistance, being thin enough to allow limited seepage of dust before total blockage due to penetration can occur. Sound mechanical design can have a great effect on running costs, particularly maintenance, and on collection efficiency.

12867 **APTIC NO. 30288**

Takahashi, Satoru

DEVICE TO BURN BLOW-BY GAS OF ENGINE. *(Enjin no fukinukegasu nensho sochi). Text in Japanese. (Suzuki Automotive Industries (Japan)) Japan. Pat. Sho 45-37489. 2p., Nov. 27, 1970. (Appl. July 16, 1967, claims not given).*

This device features an ignition plug in the exhaust gas passage located immediately outside the exhaust port of the cylinder. Blow-by gas, discharged into the exhaust pipe without being burned in the cylinder, together with other unburned gases accumulates at the point immediately before closure of the exhaust valve. These unburned gases contain harmful substances such as hydrocarbons and are difficult to ignite by the conventional air injection type combustion system, since the blow-by gas is low in temperature. An after-burner system, another type of combustion device to burn these gases has the disadvantage of requiring a warm-up period after engine start-up. The new device solves these problems. Independent of the ignition power circuit for the ignition plug of the cylinder, a similar ignition circuit is set up for after-burning ignition plug. The circuit consists of the battery, an ignition coil, and a separate interrupter provided in the distributor. This arrangement works to ignite the after-burning ignition plug at a time preset by the separate interrupter of the distributor. The ignition may be timed to occur immediately preceding closure of the exhaust port, when a maximum of blow-by gas has accumulated. However, this timing often results in premature ignition of gas in the cylinder and other undesirable effects, so that ignition timed to occur immediately following closure of the exhaust port may be preferable.

12868 **APTIC NO. 30342**

Takahashi, Takeshi, Akira Kanagawa, and Akira Yokochi

VENTILATION CAPACITY OF DOUBLE HEAD-CUT CONE TYPE CENTRIFUGAL COLLECTOR. *(Niju tosetsu ensuigata enshin shujinki no sofu seino). Text in Japanese. Preprint, Japan Society of Chemical Engineering, Tokyo, 4p., 1971. (Presented at the Japan Society of Chemical Engineering Convention, Annual 36th, Tokyo, Japan, 1971, Paper E311.)*

A double head-cut cone-type centrifugal dust collector is characterized by a self-ventilating ability. The ventilation capacity of a trial collector, the power of ventilation and the wind loss by the rotational cylinder were examined. An orifice for measuring the flow quantity was placed at the intake duct of the collector and a valve was placed at the exhaust duct. Manometers for measuring static pressure and thermometers were set at both sides. A shunt generator was used as the power source. The rotational number was measured with a pulse counter and an ammeter. Close agreement was obtained between observed and calculated value of pressure. Therefore, the ventilation capacity is proportional to the square of the rotational number. Ventilating pressure for this collector was nearly equal to that of shuttlecock type. The ventilating quantity was measured by the orifice by a dry-type gas meter and a hotwire anemometer. The flow quantity was proportional to the rotational number. Centrifugal collectors have high power requirements. Power conducted to shaft was dissipated as ventilating power, motion of rotator, bearing confliction and wind. Efficiency of this machine as a ventilator was about 13%. Power was dissipated as wind loss by the rotator and gas in the mantle, and power loss increased at high-speed rotation. The wind loss was a function of confliction coefficient, rotational angular velocity, the radius, and the length. The coefficient was represented as a function of Reynolds number, the rate of radius and the space between the cylinders. Wind loss of this machine was roughly equal to power giving air.

12869 APTIC NO. 30359

Takenawa, Tagao

FILTER ELEMENT FOR AIR CONDITIONING DEVICE. *(Kuki chowa sochi to ni okeru firuta eremento). Text in Japanese. (Tagao Takenawa, Japan) Japan. Pat. Sho 46-12460. 3p., April 30, 1971. (Appl. Jan. 16, 1968, claims not given).*

A connector frame that will be attached to both ends of a filter element so that a desired number of filter elements may be easily connected to make an air filter of the desired size is described. An air filter used in an air conditioner must be wide in area; several filter elements must be used to make such a wide filter. Under the conventional method, these filter elements are simply placed end to end in the air filter frame and held in place. When connected, a gap is formed between the ends of the filter elements due to differences in dimensions. Air often goes through the gap unfiltered, eventually lowering the efficiency of the filter. Primarily designed to eliminate this defect, the new end connector frame also allows the simple removal of the filter from the air conditioner when it must be cleaned. The end connector frame is an L-shaped edge trimming which is as wide as the filter element and as high as or a little shorter than the thickness of a filter element. Both ends of a filter element are wound by a reinforcement band. The end connector frame is spot-welded onto this band in such a way that the bent edge of the connector frame faces downward and there is a small gap between the bent edge and the end of the filter element. Another end connector frame is attached to the other end of the filter element in a similar manner, but the bent edge faces upward. To connect one filter element to anotheer, the bent edge of the connector frame fitted to one end of the filter element is inserted into the small gap formed between one end of another filter element. This makes assembly of filter elements very easy and eliminates the possible gap between two filter elements.

12870 APTIC NO. 30285

Tamori, Ikuo, Nobuyuki Kogure, and Kanunari Imagami

PROPOSAL OF CYLINDRICAL FILTER PAPER METHOD FOR STACK DUST SAMPLING. *(Endo baijin nodo kani sokuteiho no teisho). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 435-438, May 1971. 5 refs.*

A dust tube sampler is a glass tube equipped with a nozzle and packed with glass fiber material. Combined with a pump, it is inserted into a stack and sucks in the stack gas to filter the stack dust with the packed glass fiber. Experience is needed to prepare and operate the sampler efficiently. The commercially available fiber is likely to cause chemical changes with the stack gas unless pre-treated properly. Therefore, it is impossible to achieve 99% or higher dust collection efficiency unless the criteria are strictly observed. The dust tube sampler must be combined with nozzles and pumps of various sizes and capacities to provide 0.5 m/s or lower apparent flow velocity in the dust tube. This makes the sampling rather troublesome. The new cylindrical filter paper method makes the sampling simpler and more efficient. The new tubular filter paper is made of heat-resistant glass fiber instead of the conventional cellulose fiber. The filter paper holder unit has been redesigned to allow easy replacement of the filter paper. It is made of glass or aluminum to allow insertion into the stack for sampling. Characteristics of the new filter paper have been tested only to reveal they are superior to any of conventional counterparts. Compared with the Dust Tube Method, the new cylindrical filter paper method has several advantages: selection of sampler size is not necessary, since standardized filter paper is readily used; it gives pressure loss and dust-arresting characteristics of constant value, so that it can give high reliability free of individual test errors; due to low pressure loss, suction volume can be made larger and suction time made shorter. This allows the use of a smaller pump and makes the entire unit portable. Another feature is the fact that it takes only one hour to dry the sampler, compared with one night with the dust tube method.

12871 APTIC NO. 30885

Theodore, Louis and James Pardini

APPLICATION OF MODELING AND SIMULATION TECHNIQUES TO THE DESIGN OF ELECTROSTATIC PRECIPITATORS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 28p., 1971. 8 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 64th, Atlantic City, N. J., June 27-July 2, 1971, Paper 71-124.)*

A method was presented for mathematically modeling an electrostatic precipitator using a deterministic rather than statistical approach. Equations were developed governing particle trajectories on the basis of a force balance around individual particles. These equations account for particle acceleration, wall drag, and the effect of Reynolds number on particle drag, in addition to the variables traditionally found in particle migration equations. Three different flow regimes in the two most common types of precipitators were investigated. The model consists of a system of three simultaneous differential equations. In each case, it was solved for the precipitator height necessary for a 100% theoretical collection efficiency. The inclusion of a particle acceleration term had a negligible effect. However, the inclusion of wall drag effects was significant. In addition, precipitator height was a linear function of particle size only for particles smaller than 30 micron due to the effect of Reynolds number on the particle drag force. The results presented cover a range of particle sizes, electric field strengths, and discharge to collection electrode spacings. The calculated results from this digital simulation can be used to evaluate the effects of new and/ or different precipitator geometries, aerosol properties, and electrical conditions. The application of Monte Carlo techniques was suggested for design studies involving different particle size and particle concentration distribution.

12872 APTIC NO. 30884

Tillman, Edward S., Jr.

AN ANALYTICAL STUDY OF THE PERFORMANCE OF A VENTURI SCRUBBER. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 40p., 1971. 12 refs. (Presented at the Air Pollution Control Association Annual Meeting, 64th, Atlantic City, N. J., June 27- July 2, 1971, Paper 71-153.)*

The mechanism of particulate collection by water droplets in a venturi scrubber was investigated for a simplified analytical model. An idealized scrubber was postulated in which a monodispersed dust was collected by a monodisperse water spray. The equations of motion for the water droplets were solved using a finite element technique and an empirical drag law. The impaction collection efficiency for each individual droplet in the turbulent air was calculated. The collection efficiency of the scrubber was calculated on a digital computer by summing the amount of dust collected by representative water droplets over the entire drop population in the scrubber. Various measured values of turbulence level were entered into the program. Significant changes in the free stream turbulence produced relatively small changes in the overall scrubber collection efficiency, suggesting that free stream turbulence does not play a direct role in the collection mechanism. Three typical design problems were investigated to demonstrate the usefulness of the method as a design tool. The first study showed the effect of water drop size on collection efficiency. For this model, the most efficient collection of one micron dust was by a 50 micron water spray. The second study showed the importance of water flow rate. The third study showed that the best point for injection of the water was slightly upstream of the throat. Two future improvements, the inclusion of a pressure drop calculation and the ability to handle nonuniform dusts were discussed. (Author abstract modified)

12873 APTIC NO. 30617

Toba, Yukichi and Eigo Imai

SEPARATOR. *(Bunriki). Text in Japanese. (Chuo Boshoku Kogyo K. K. (Japan)) Japan. Pat. Sho 46-12457. 2p., April 30, 1971. (Appl. March 21, 1968, claims not given).*

A centrifugal separator designed to separate solids and liquids from a gas usually has a tuyere, or guide blade unit built inside. However, the head section of this tuyere unit is not used to add to the higher overall efficiency of the separator. Another disadvantage is that the gas hits the head section at a right angle, resulting in a greater pressure loss. These defects can be eliminated by redesigning the head or cap section of the tuyere unit. The main casing of the separator is a horizontally placed cylinder. The gas intake port is provided in the left side and the discharge port in the right side. A small liquid outlet port, located below the discharge port, is placed at a right angle against the axis of the cylindrical main casing. The tuyere unit, provided with a number of blades, is installed in the left half of the interior of the main casing. A conical cap section is attached to the top of the tuyere unit. The section is provided with several spiral grooves running in radial directions from the tip. The base area of the conical cap section is a little larger than that of the top area of the tuyere unit. The spiral grooves may be substituted by similar projections. This design of the head section of the tuyere unit helps gas flow smoothly to the unit while minimizing the pressure loss.

12874 APTIC NO. 30404

Tsumimura, Shigekazu

CENTRIFUGE TYPE VISCOUS DUST COLLECTOR. *(Enshin nenchaku shujinki). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 46-4235. 4p., Feb. 2, 1971. (Appl. March 7, 1967, 1 claim).*

A dust collector is described which removes viscous dust such as microgranular paint dust or moist dust which is likely to adhere to the wall of a dust collector. It consists of a tubular dust collector section and a blower section. The blower section is in a separate casing, but is connected to the dust collector section by the exhaust tube and the central rotary, shaft. The fan of the blower is mounted on this shaft and housed in the blower section casing. The upper end of the shaft is fitted to an electric motor provided above the blower section. The shaft plunges through the blower fan, the exhaust tube, and the dust collector chamber down to the bottom chassis. The main unit, consisting of the dust collector section and blower section, is held in place by posts erected on the bottom chassis. The dust collector section is installed in such a way that it can freely turn on the central shaft. The part of the central shaft located in the dust collector chamber is provided with a spiral groove. Mounted onto this groove is a cylinder that slides up and down and can turn on the shaft. A horizontal arm, equipped with a scraper, is fitted to this cylinder in such a way that the scraper may be spaced a short distance from the inner wall of the dust collector chamber. The air intake port is on the upper left side of the dust collector chamber, while the discharge port is in the bottom. The air exhaust port is in the blower section casing. With the blower operating, air in the dust collector chamber is sucked into the blower section, so that outside air is teken into the chamber through the air intake port. The air taken into the chamber moves along the inner wall, giving a turning flow, and goes through the exhaust tube into the blower section. Dust in the air is then removed by centrifugal force and falls to the bottom, where it is discharged through the discharge port. The sticky dust accumulates on the inner wall. The entire dust collector section revolves with the friction of air, but the slide tube lags behind due to friction resistance generated between the scraper and the dust layer formed on the inner wall. This causes a differential revolution between the shaft and the slider tube. A similar differential revolution is caused between the scraper and the inner wall. Thus, the dust accumulated on the wall is efficiently scraped. Since the dust collector section also revolves, the air intake port turns to face all directions and takes in air from all directions.

12875 APTIC NO. 30797

Veenemana, C. J.

EXHAUST EMISSION CONTROL IN THE USA AND EUROPE. *(Luchtverontreiniging door uitlaatgassen van automobielmotoren; 1. De bestrijding van de luchtverontreiniging door automobielmotoren). Text in Dutch. Ingenieur, 82(23):51-60, June 5, 1970. Presented at the International Conference on Air Pollution due to Automotive Exhaust, Delft, Netherlands, Dec. 17, 1969.)*

A summary is presented of the dangers created by automotive exhaust; the various standards and methods of measurement used in various countries; the mechanism by which carbon monoxide, hydrocarbons, and nitrogen oxides are produced in automotive engines; and a description of research performed by Doorne s Automobielfabrieken (DAF) of Eindhoven, Netherlands. The original research was performed on a two-cylinder air-cooled 844 cubic centimeter motor. Careful measurements were made of hydrocarbon emissions as a function of the ignition timing. A delayed spark corresponds to lower hydrocarbon emissions. A combination of delayed spark and a higher idling speed of the engine is effective in reducing hydrocarbon emissions during deceleration. A method is described for automatically regulating the ignition to a delayed performance during deceleration.

12876 APTIC NO. 30800

Versloot, J.

MEASURES AGAINST AIR POLLUTION BY CAR ENGINES. *(Bestridjing van luchtvervuiling veroorzaakt door automotren; een bijdrage in de bestrijding van Du Pont). Text in Dutch. Polytech. Tijdschr. Ed. A., 26(12):510-514, June 9, 1971.*

A description is given of a thermal exhaust reactor developed by Du Pont, which is to be used in combination with the recirculation of exhaust gases, carburetor modification, and appropriate adjustment of the ignition timing in an automotive engine, by means of which the carbon monoxide, hydrocarbon, and nitrogen oxides content of automotive exhaust gases can be reduced to levels prescribed by recent American legislation. The Du Pont reactor is inexpensive and operates on a very simple principle. It consists of a cylindrical housing, inside of which is a tubular passage, heat-insulated from the housing, into which the recycled exhaust gases are brought. The heat imparted to these gases in the chamber causes the carbon monoxide and hydrocarbons to oxidize, forming carbon dioxide and water vapor. Recycling of a portion of the exhaust gases to the engine intake system lowers the maximum temperature in the engine cylinder, a condition that tends to minimize the formation of nitrogen oxides. Tests of this recycling system by Du Pont, over a mileage of about 32,000 km with normal leaded gasoline, yielded an average of 1.3 grams of nitrogen oxides per mile of driving. The 20,000 miles was covered without any maintenance or repairs to the system. Du Pont has also proposed a cyclone separator for the automotive engine, as a means of removing particulate matter from the exhaust. Tests conducted over the equivalent of 42,000 miles of driving distance indicate that such a system is capable of removing 66% of the particulate emissions from the exhaust.

12877 APTIC NO. 30745

Vickers, P. T., J. R. Mondt, W. H. Haverdink, and W. R. Wade

GENERAL MOTORS STEAM POWERED PASSENGERS CARS – EMISSIONS, FUEL ECONOMY AND PERFORMANCE. *Preprint, Society of Automotive Engineers, Inc., New York, 23p., 1970. 40 refs. (Presented at the Society of Automotive Engineers, National West Coast Meeting, Los Angeles, Calif., Aug. 24-27, 1970, Paper 700670.)*

A program was undertaken to design, build, and evaluate the vapor cycle engine in terms not only of modern technology, but also of current transportation requirements. A steam engine was built and installed in a 1969 Chevelle, which is an intermediate size passenger car. The technology of the Doble steam car of the 1920 era was retained. Meanwhile, a task force was assembled to design, build, and install a vapor cycle engine in a Pontiac Grand Prix. Water was selected as the working fluid. Start-up time, exhaust emissions, fuel economy, acceleration, and water consumption data are compared for the Besler Chevelle, the GM Pontiac, and a Doble steam car.

12878 APTIC NO. 30889

Vincent, James H. and Julius V. Przygocki

EVOLUTION OF A GRID-TYPE ELECTROSTATIC PRECIPITATOR. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 29p., 1971. 5 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 64th, Atlantic City, N. J., June 27-July 2, 1971, Paper 71-126.)*

A grid-type electrostatic precipitator called the Mirror Grid was developed as an add-on unit to existing conventional industrial electrostatic precipitators whose performance in removing particulate emissions need to be upgraded. The Mirror Grid is constructed so that a number of perforated plates are placed parallel to one another and perpendicular to the main gas flow on the exhaust side of the conventional precipitator, with an electric field applied between each successive grid pair. In the predominant mode of collection, charged dust particles exiting from the conventional precipitator are entrained into the vortices formed in the wakes of the solid portions of each grid, and precipitated from there onto the grid surfaces by the action of the electric field. In small-scale laboratory experiments, models with up to six stages yielded efficiencies of up to 70%. When placed in series with a conventional precipitator, there was an increase in overall collection efficiency of from 97% to greater than 99%. Further results showed that, for given rms values, the principle of the device seems to be valid using alternating current as well as direct current. Preliminary tests with a large-scale laboratory unit yielded efficiencies which were actually somewhat in excess of those obtained for corresponding conditions in the small-scale units, demonstrating that the device can be successfully scaled up to industrial dimensions. (Author abstract modified)

12879 APTIC NO. 30738

Waid, Donald E.

THE CONTROL OF ODORS BY DIRECT FIRED GAS THERMAL INCINERATION. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 50p., 1971. (Presented at the Air Pollution Control Association Annual Meeting, 64th, Atlantic City, N. J., June 27-July 2, 1971, Paper 71-23.)*

The thermal incineration process and its application to odor control are discussed. Thermal incineration is the process of oxidizing combustible material by raising the temperature of the material above its auto ignition temperature and holding it there for a brief period of time to complete its oxidation. Direct flame thermal incineration can control organic air pollutants to almost any desired limit. The simple control of temperature allows the required amount of pollutant control. This flexible method can be changed simply as the code requirements change by modifying the operating temperature. In many cases, the oxygen from the effluent can be used for combustion, reducing the fuel consumption requirements. When the heat is reused in the system or elsewhere in the plant, little fuel is needed for incineration. The planning and designing of a thermal incinerator are discussed. Plant survey information required, design objectives, and operating parameters for the unit are listed. Extensive field tests and field experience are cited to point out the practical aspects of successful and efficient design and operation of thermal incinerators. One advantage of this method is that total hydrocarbon and carbon monoxide control can be combined with odor control in the same process. (Author abstract modified)

12880 APTIC NO. 30587

Weber, Ekkehard

ANNUAL SURVEY MAINTENANCE OF CLEAN AIR (7TH SUCCESSION). *(Jahresuebersicht Reinhaltung der Luft (7. Folge)). Text in German. Giesserei, (Duesseldorf), 58(12):379-385, June 17, 1971. 79 refs.*

A literature survey and evaluation of articles, papers, and books, dealing with any field of air pollution, published since 1968 is given. The gravimetric method has been preferably used in Bulgaria for the past 15 years for determining the total dust concentration in the ambient air. The capital investment costs for dust collectors rose from 280 million in 1964, to $840 million in 1970, in the Federal Republic of Germany. It is estimated that it will reach two billion dallars in 1975. Most of the investment went into wet dust collectors with 30.2% of the total costs, followed by electrostatic precipitators with 29.8%, and mechanical dust collectors with 15%. For the wet collection of dust in cupola furnaces, it is estimated that the total costs, including capital investment costs, operating costs, and costs for power supply, water consumption, and neutralizing agents, amount to $6.96/hr at a furnace capacity of 10 tons/hr.

12881 APTIC NO. 30323

Wehner, Herbert

ATTEMPTS FOR IMPROVEMENT OF THE EMISSION PROPERTIES OF DIESEL ENGINES. THE EXHAUST GASES OF TRUCKS. *(Die Abgase von Lastkraftwagen. Versuche zur Verbesserung des Emissionsverhaltens von Dieselmotoren. Text in German. VDI (Ver. Deut. Ingr.) Nachr. (Berlin), 25(15):27, April 1971.*

Diesel engines are operated at all loads and rpm numbers with an air surplus of at least 20. Therefore, carbon monoxide formation is lower than in engines. Diesel engines also emit less hydrocarbons than engines. The soot formation in Diesel engines can be controlled through good maintenance of the engine. The carcinogenic 3,4-benzopyrene was found in the soot of heavily smoking Diesel engines. Diesel engines with direct injection emit a maximum nitrogen oxides concentration of about 1800 ppm to 2500 ppm; diesel engines with divided combustion emit between 700 ppm and 1000 ppm. Only one testing cycle is available and will be applied in the U. S. beginning on Jan. 1, 1973 to all diesel engines with a total weight of more than 6000 pounds. Limit values were established in November, 1970 and will become effective on January 1, 1973. The NO2 and hydrocarbon emissions will be limited to 16 g/HP h and CO emissions to 40 g/HP h. From January 1, 1975, on the NO2 and hydrocarbon emission limit will be lowered to 5 g/Hp h and the CO emission to 25 g/HP h.

12882 APTIC NO. 30612

Wierick, Dieter and Werner Schneider

QUALITY CRITERIA FOR AUTOMATIC OPTIMIZATION OF THE AIR/FUEL RATIO AND THE WASTE GAS TEMPERATURE OF PULVERIZED COAL-FIRED BOILERS. *(Guetekriterien zur automatischen Optimierung des Luftverhaeltnisses und der Abgastemperatur kohlenstaubgefeuerter Dampferzeuger). Text in German. Energie Tech., 21(5):207-213, May 1971. 22 refs. (Presented at the Kraftswerkstechnischen Kolloquiums der Sektion Energieumwandlung der Technische Universitaet Dresden, Nov. 1970.)*

As quality criteria for the best air/fuel ratio, the minimum sum from waste gas loss and loss through gaseous and solid noncombusted matter, or the maximum boiler efficiency, is used. Optimization of the air/fuel ratio without considering the loss through solid non-combusted matter is not recommended because the efficiency is lowered and the heating surfaces must be cleaned more often. Since the optimum magnitude of the air fuel ratio changes with the operating conditions, an automatic optimization is advisable. The optimum waste gas temperature is then achieved when the sum total of fuel costs plus additional costs for low temperature corrosion are at a minimum. A regulating circuit can be used for adjusting the optimum waste gas temperature, which is found by continuous sulfur trioxide determination. 0 The adjustment is achieved through changing the operation of the air preheater.

12883 APTIC NO. 30220

Yamada, Hiroshi

ON REMOVAL OF SULFUROUS ACID GAS FROM EXHAUST SMOKE. *(Haien chu no aryusangas jokyo ni tsuite). Text in Japanese. Nenryo Oyobi Nensyo, (Fuel and Combustion), 38(2):32-39, Feb. 1971.*

Although the use of low-sulfur crude oil or liquid natural gas fuel is most desirable for the reduction of sulfur dioxide in the fuel gas, the supply of these fuels is very limited. The desulfurization of heavy oil gives rise to the problem of marketing sulfur, its by-product. Another problem is that it gives a comparatively lower rate of desulfurization, i.e., 70-80% with the direct desulfurization and 30-40% with the indirect. To raise the rate of desulfurization, the process requires consuming a sharply increased volume of hydrogen, thus causing the cost of desulfurization to increase. The desulfurization of exhaust gas in a large-scale plant can achieve a desulfurization rate of up to 90%. The two methods may be used in combination for more economical desulfurization; the heavy oil desulfurization process performs the rough removal of sulfur, while the exhaust gas desulfurization removes the remaining sulfur content. Special boilers designed to burn high-sulfur heavy oil fuel may be installed and combined with a desulfurization device. In this connection, the flue gas desulfurization processes developed by Mitsubishi Heavy Industries were introduced, including the Mitsubishi Activated Manganese Oxide Method and the Mitsubishi Wet Lime Method. The former uses a powdered absorbent while the latter uses a lime-slurry absorbent. The activated manganese oxide method consists of a SO2 absorption process, an absorbent regeneration process, and an ammonium sulfate recovery process. The activated manganese oxide (MnOx nH2O) is fed and dispersed in the exhaust gas and reduced to manganese sulfate through a reaction with SO2 or SO3. The manganese sulfate and the absorbent that has not yet reacted with SO3 or SO2 are arrested by a multicyclone and electric dust collector, while the cleaned exhaust gas is discharged through the chimney. The wet lime method consists of a SO2 absorption process and a sulfite lime oxidation process. The exhaust gas is moistened and cooled to 60 C in a water spray tower to improve the absorption efficiency, thereby removing the dust and SO3 at the same time. The gas is then led to the first and second absorption towers. A milky solution of slaked lime (Ca(OH)2) is sprayed into the gas in the second absorption tower, so that SO2 in the gas can be removed as sulfite lime (CaSO3). The cleaned gas goes through the mist separator and is heated by after-burning; it is then discharged from the chimney.

12884 APTIC NO. 30619

Yamashita, Yoshibumi and Shigeo Asano

FILTER-TYPE DUST COLLECTING DEVICE. *(Roka shujin sochi). Text in Japanese. (Daido Seiko K. K. (Japan)) Japan. Pat. Sho 46-5114. 2p., Feb. 8, 1971. (Appl. Oct. 13, 1966, 1 claim).*

A bag filter with reduced space requirements is described. The bag is made with vertical pleats, so it combines compactness with increased filtering area. Each pleat is held in place by the structural frame combined with wire nets. The entire structure of the bag resembles a lantern with accordion pleats. The bottom of the structural frame is linked, via an adaptor, to a handle-operated dust shake-off device consisting mainly of a bevel gear assembly. Air or gas is taken into the bag through an opening at the top. Dust removed from air or gas accumulates on the inner surface of the filter cloth. To dislodge dust from the filter cloth, the handle of the shake-off mechanism is alternately turned clockwise and counterclockwise. This moves the adaptor right and left to shake the structural frame of the bag, thereby freeing the dust. The dust then falls through a discharge port at the bottom of the bag to a dust box.

12885 APTIC NO. 30343

Yokochi, Akira, Takeshi Takahashi, and Akira Kanagawa

COLLECTION CAPABILITY OF DOUBLE HEAD-CUT CONE TYPE CENTRIFUGAL DUST COLLECTOR. *(Niju tosetsu ensuigata enshin shujinki no hoshu seino).*

Text in Japanese. Preprint, Japan Society of Chemical Engineering, Tokyo, 3p., 1971. 3 refs. (Presented at the Japan Society of Chemical Engineering Convention, Annual, 36th, Tokyo, Japan, 1971, Paper E312.)

The collection capability of a double head-cut cone type dust collector was examined with fly ash as the sample. Particle diameter was measured with an optical microscope and side-type particle counter. Sampling was done with the uniform suction of a vacuum pump through a Milipore filter. The sampling filter cleared by immersion oil was placed on a slide glass, and microscopic photographs were taken. Particle diameter was measured by a particle counter using a Loyco-type classified circuit and a wave height analyzer for radioactivity. For measuring collection efficiency, the particle supply unit was required to be stable with respect to quantity supplied and time. Particles were packed into a tube and stirred with a cutter at a constant speed. They were ejected by supplied air, hit an obstacle board, and dispersed. With the same rotational number, an increase in the quantity of gas treated effected the collection capability remarkably. When the flow quantity supplied is small, the increase of the rotational number theoretrically limits particle diameter. The effect on the rotational number decreases if gas supply flow quantity increases. With the trial particle supply system, the collecting efficiency for fly-ash particles was examined under many conditions. When the rotational number was 3000 rpm and gas supply flow quantity was 10.2 cu m/min, collection efficiency for three micron particles was more than 0.9. When the number was 5000 rpm and the flow quantity was within 18.2 cu m/min, it was more than 0.9 for five micron particles.

12886 APTIC NO. 30757

Ziekman, Pa.

A THEORETICAL STUDY OF AEROSOL FILTRATION BY ELECTRET FILTERS. *Rijksverdedigingsorganisatie TNO, Rijswijk (Netherlands), Chemisch Lab., Rept. 1970-17, 27p., June 1970. 15 refs.*

NTIS: N71-13519

A new concept in aerosol filtration is represented by electret filters, which consist of electrified plastic fibers and are characterized by external electric fields. Particle trajectories in the neighborhood of a single electret fiber were calculated with the Kuwabara-Happel stream function for filters with porosities of 80 and 90% and with fibers 23 micron in diameter. Electrical interaction effects due to the neighboring fibers were taken into account. The results demonstrate increased single fiber collection efficiency in comparison with nonelectrified fibers, thus confirming experimental findings. Maximal collection efficiency can be expected for the electrically higher charged particles at lower Reynolds numbers. Collection efficiency is also greater at a porosity of 0.90. This is an added advantage because the higher the porosity the lower the pressure drop. A computer program for calculating particle trajectories is also discussed.

12887 APTIC NO. 30190

Zimmermann, Lothar

ELECTROSTATIC DUST PRECIPITATORS IN CEMENT WORKS. *(Elektricke odlucovace prachu v cementarnach). Text in Czech. Stavivo, 49(2):70-72, 1971.*

Electrostatic precipitators have been in successful use for a number of years for the purification of waste gases from the furnaces and mills of cement works. Their great advantage is that they permit effective separation of fine dust in high concentrations. While the initial cost of such equipment is relatively high, cost of installation and maintenance is lower than with any other system. The layout and design of the equipment should provide for the possibility of having the gas enter the precipitator, as far as possible, at always the same temperature and humidity. This can be achieved by incorporating into the system evaporator coolers with water injection, with automatic control in dependence of temperature and gas volume. Typically, a gas temperature of 70 C is conducive to proper operation. The required condition after precipitation is a dust content of less than 500 mg/cu m, but with a favorable arrangement 150 or even 50 mg/cu m dust concentration after purification has been achieved. For best efficiency, the gas supply to the precipitator should be kept at a reasonably constant rate. The removal of the dust from the collecting electrodes is best effected intermittently, using automatic time relays for timing the knocking-off operation.

MEASUREMENT METHODS

12888 APTIC NO. 30194

INFRARED ANALYZER SUPPORTS WASTE GAS COMBAT. *(Infrarot-Messgeraet unterstuetzt die Abagasbekaempfung). Text in German. Technica, 20(12):1164, 1971.*

An electronic unit is available for automobile inspection stations and service stations which permits the optimum idling adjustment of Otto engines. The unit operates according to the infrared absorption principle. The infrared absorption of carbon monoxide within certain wave lengths in measured. The method is insensitive to interference by hydrogen, carbon dioxide, and unburned hydrocarbons. The analyzer is equipped with a sampling probe and a condensate precipitator. A calibration device may be installed without test gas. In Germany, the CO content of 4.5% vol of the waste gas is permitted. This concentration will be lowered in future. The analyzer can be easily adjusted to any lower concentration.

12889 APTIC NO. 30206

AN AIR POLLUTION MEASURING NETWORK: RESTRICTIONS VOLUNTARILY IMPOSED. *Heating Ventilating Engr. J. Air Conditioning (London), 44(522):359-360, Jan. 1971.*

In the heavily industrialized area between Rotterdam and the North Sea (i.e., the mouth of the Rhine), 31 detector masts coulemetrically measure atmospheric sulfur dioxide 64 times/hr and pass their findings electronically to a warning center where the average values for each detector are calculated by computer. When the results exceed a fixed threshold value, the computer issues an internal warning. If the weather forecast at that moment predicts unfavorable weather conditions for the next six hours, the internal warning is followed by a cooled warning, given by a semaphone network, to 21 large plants. Less than a minute is required to identify a source of abnormally high pollution since the position of the detector masts is indicated with lamps on a wall map. Reportedly, the amount of sulfur compounds in the air of the region shows a marked decrease, and nitrogen oxides have been maintained at a constant level.

12890 APTIC NO. 30360

Japan Environmental Sanitation Center, Tokyo

A REPORT OF INVESTIGATION AND ANALYSIS OF SUBSTANCES OF AIR POLLUTION. *(Taikiosenbusshit-*

su no chosa bunseki hokokusho). Text in Japanese. 23p., March 1968. 12 refs.

The technical problems of the NASN measurement method for analyzing metallic elements in atmospheric dust was studied. Hydrochloric acid was superior to nitric acid for abstracting chromium and copper. This method made the background of the spectrum become dense, and its sharpness decrease. Lithium chloride, which is used as a buffer in electrode manufacturing, absorbs humidity. The application of sodium chloride was examined, but a satisfactory result was not obtained. The application of indium, strontium, and platinum as internal standard substances was examined; platinum was found to be unsuitable. Four changes were added to the NASN method, based on these results. Metallic elements were analyzed in floating dusts sampled from April, 1967 to March, 1968 at five national stations of air pollution. The following suggestions were made: use strontium as an internal standard substance; exclude the absorption of humidity by LiCl by electrode heating equipment and continue the preliminary electric discharge for three seconds. An average per year measurement of elements in soots and dusts was as follows (unit of weight microgram/cc m): total quantity of soots and dusts 208, quantity of organic substances - 12.0. The quantity of water soluble substances was: phosphorus 6.8, sulfates 17.5, and nitrates - 3.2; the quantity of metallic elements was: titanium 0.148, vanadium - 0.129, chromium - 0.008 manganese 0.163, iron - 6.14, nickel - 0.045, copper - 3.03, lead 0.96, beryllium - less than 0.001, and cadmium - less than 0.001.

12891 APTIC NO. 30361

Yokohama Municipal Office (Japan)

RESEARCH CONCERNING THE METHOD OF INVESTIGATION ON THE INFLUENCE OF ATMOSPHERIC POLLUTION AS A PART OF LOCAL ACTIVITIES ON MEDICAL ASSOCIATIONS. *(Ishikai no chiikikatsudo to shiteno taikiosen eikyo chosa hoshiki ni kansuru kenkyu hokokusho). Text in Japanese. 66p., March 1968.*

The investigation form of the British Medical Research Council (BMRC) is the best way to examine the influence of atmospheric pollution on the respiratory organs as a part of the local activities of medical associations. An investigation conducted by the Isogo Medical Association of Yokohama City, Japan, in 1966 and 1967 on the effects of air pollution used the BMRC form. Other topics discussed include: the connection between local administrative bodies of health and local organizations; the activities of members of medical associations, ex post facto management, and the cooperation of those who are the object of the investigation, especially those who are incapable of interviews. Four conditions must be observed when medical associations conduct these investigations as a part of their local activities: investigation shall be made based on medical science; maximum effect should be obtained in minimum time consumption; over-all cooperation should be obtained from local administrative bodies of health especially from the local health center; and expenditure should be minimum. An intermediary report of an investigation in Sogo ward is presented in tabular form.

12892 APTIC NO. 30664

Kinkichiho Taikiosen Chosarenrakukai Chiken Kogai Kenkyuhan (Japan)

STUDIES ON THE MECHANISM OF INTERACTION AMONG SUBSTANCES CAUSING AIR POLLUTION AND ON THE METHODS FOR MEASUREMENT OF FLOATING DUSTS. *(Taiki-osenshitsu no sogosayokijo oyobi fuyufunjin sokuteiho no kenkyu). Text in Japanese. 115p., March 1970. 2 refs.*

Dusts were collected and their metallic contents analyzed in five hygienic laboratories in the Kinki district. Based on these results, the power of a high-volume air sampler and several other samplers were evaluated. The relationships between the effects of sampler filters and cyclones, the amounts and velocities of air inhalation, the amounts of collected dusts, and particle sizes were discussed. The structure of samplers differed. This affected the amount of collected dusts, particle size, and the component of dusts, and resulted in experimental errors. The relationship between the sulfur dioxide contents, which were measured by the lead peroxide method, and the experimental conditions, such as temperature and humidity, was also investigated using a device for constant SO2 production.

12893 APTIC NO. 30874

Abernethy, Roy F. and Elizabeth A. Hattman

COLORIMETRIC DETERMINATION OF BERYLLIUM IN COAL. *Bureau of Mines, Pittsburgh, Pa. Pittsburgh Energy Research Center, Rept. 7452, 8p., 1970. 6 refs.*

NTIS: PB 196606

A colorimetric method for determining beryllium in coal ash entails putting samples into solution by standard wet chemical procedures, complexing interfering elements, and separating the beryllium by extraction of its acetyl acetone complex with chloroform or carbon tetrachloride. Final determination is made with Beryllon II. As little as 0.5 microgram of beryllium can be recovered by this method, which was used to determine beryllium in the ash of 34 U. S. coals. The percent of ash in the coals was 1.9 to 31.7; and these ashes contained 0.0005-0.020 percent beryllium. Tests of float and sink fractions of three coals showed that in these coals the beryllium is associated with organic fraction.

12894 APTIC NO. 30719

Argirowa, Maria

COMPARATIVE STUDIES ON THE METHODS OF DETERMINING SULPHUR DIOXIDE IN THE AIR OF THE ATMOSPHERE. *(Vergleichende Untersuchungen ueber die Bestimmungsmethoden von Schwefeldioxid in der atmosphaerischen Luft). Text in German. Wiss. Z. Humboldt Univ. Berlin Math. Naturw. Reihe, 19(5):533-534, 1970.*

The sensitivity, reliability, and practical usefulness of four analytical methods for the determination of sulfur dioxide in the air of the atmosphere were compared. The methods involved the reaction between SO2 and p-rosaniline-formaldehyde in an absorption solution of mercury and sodium chloride with subsequent colorimetric evaluation, the reaction between SO2 and a fuchsine-formaldehyde solution in an absorption solution of mercury and sodium chloride, a nephelometric method, and the Alexijewa-Samorodina method using fuchsine-formaldehyde. The study disclosed that the exact reproducibility, standard deviation, and mean error of the three colorimetric methods were identical. The nephelometric method was encumbered with an error of + or 25.8%. The presence of nitrogen dioxide and chlorine was found to interfere with the p-rosaniline method, that of NO2, hydrogen sulfide and Cl2 with the fuchsine method. While no ascertainable differences could be found between the results of the three colorimetric methods in the laboratory, their application in practice contradicted this finding which is proof that hitherto unknown factors are at work.

12895 APTIC NO. 30651

Asami, Masukichirou, Shinobu Esaka, Sachiko Kusakabe, and Koichirou Kitazawa

STUDIES OF THE MECHANISM OF SO2-PBO2 REACTION BY MEANS OF AN APPARATUS GENERATING SO2 IN CONSTANT CONCENTRATION. 1. CONSTRUCTION OF THE APPARATUS AND SOME TESTS FOR ITS RELIABILITY. *(Teinodo SO2 hasseisochi ni yoru PbO2-SO2 hannokiko no kenkyu. Dai 1 po. Teinodo SO2 hasseisochi no seisaku to sono kinoshiken). Text in Japanese. Kyoto-fu Eisei Kenkyusho Nenpo (Annu. Rept. Kyoto Prefect. Inst. Public Health), no. 15:103-111, Feb. 1971. 3 refs.*

The sulfur dioxide value estimated by the lead dioxide method is likely to be affected by factors such as temperature, humidity, contact volume of SO2 concentration, and co-existing gases. An experimental device was developed to clarify these effects. The device is built to provide 1.0 3.5 l/min of SO2 for over 30 days without changing pressure and flux. This keeps the SO2 concentration of 0.3 5 ppm at plus or minur three percent. The device should also be equipped with an experimental chamber for reaction tests. The temperature and the moistening system inside the chamber is controllable, and a circuit is provided to admit other gases when needed. The stability of the draught volume caused a decline of the flux for an hour immediately after fillers had been added, but afterwards it became stable. The higher the concentration of SO2, the larger the amplitude of the deviation. However, the ratio of the deviation was always within plus or minus three to four percent. It seemed that the deviation of concentration was caused by the fluctuation of the volume of diluted air current. The function of moistening system was also satisfactory. Some preliminary tests were made with the device. Keepint the SO2 concentration at one ppm, the SO2 absorption rate by a PbO2 cylinder made of glass did not change; the higher the temperature, the greater the absorption rate. It has been concluded that the device is useful for future experiments.

12896 APTIC NO. 30263

Austin, R. R.

SAMPLING AND ANALYSIS OF PULP MILL GASES FOR SULFUR COMPOUNDS. *TAPPI, 54(6):977-980, June 1971. 6 refs.*

The analysis of black liquor recovery furnace stack gas is now an important source of data to the pulp mill. Continuous sample methods and equipment have been developed and proved practical in routine operation by mill operating personnel. Problems of particulate rejection and moisture consideration have been solved by high-temperature filtration in the stack, and in some sample systems blow back of purge is through the sample probe. Analysis by continuous sampling and electrolytic titration (coulometry) using automatically cycled wet scrubbers for sulfur dioxide removal, provides concentration data for hydrogen sulfide and total sulfur. These data are useful in furnace control and in monitoring emissions from the stack. (Author abstract)

12897 APTIC NO. 30726

Barringer, A. R. and J. P. Schock

PROGRESS IN THE REMOTE SENSING OF VAPOURS FOR AIR POLLUTION, GEOLOGIC AND OCEANOGRAPHIC APPLICATIONS. *Office of Naval Research, Washington, D. C., Geography Branch and Air Force Cambridge Research Labs., Bedord, Mass., Proc. Symp. Remote Sensing Environ., 4th, Ann Arbor, Mich., 1966, p. 779-791. 1 ref. (April 12-14.)*

NTIS, DDC: AD 638 919

Measurements of air pollutants is one of the most important applications of remote sensing equipment under development that is capable of detecting a range of gases and vapors from survey aircraft and orbiting spacecraft. Instrumentation based on a conventional spectrometer is described which has sensitivity in the parts per billion range. The equipment utilizes dispersive optics in conjunction with special correlation masks matched to the appropriate spectra, and a single unit can be programmed to detect a number of gases. Tests are being made on formaldehyde and acrolein, both important pollutants of the oxidant type. Optical air pollution monitors in orbiting spacecraft can be used to measure the total pollutant burden of the earth s atmosphere, to calculate mass transport across a given line, to investigate the rate of lateral diffusion and destruction of pollutants by such processes as chemical reaction and solution in oceans, and to acquire detailed data from inaccessible terrain. Potential application to geologic, geochemical, and marine biological applications are also discussed.

12898 APTIC NO. 30390

Bencko, V., A. Dobisova, and M. Macaj

ARSENIC IN THE HAIR OF A NON-OCCUPATIONALLY EXPOSED POPULATION. *Atmos. Environ. (London), 5(4):275-279, April 1971. 17 refs.*

Arsenic determination was conducted on the hair of one control and seven exposed groups of 10-year-old boys from communities located in the vicinity of a power plant which used a coal of high arsenic content. The plant emits approximately one ton of arsenic per day. In all of the exposed groups, despite the decontamination procedure used, a high arsenic content was found. The relationship between the observed arsenic levels in the hair and the distance of the residences from the pollution source was studied. The results corresponded to theoretical ideas on the spreading of emissions from elevated sources in the open air. They also established the applicability of arsenic determination in the hair as a direct exposure test of contamination of the environment by arsenic. The considerable variations among individual arsenic values in the hair makes group examination a necessity. (Author abstract modified)

12899 APTIC NO. 30289

Bernert, Juergen

METHOD FOR DETERMINING THE TOTAL QUANTITY OF COMBUSTIBLE ORGANIC SUBSTANCES IN HYDROPHOBIC WASTE GAS SYSTEMS. *(Methode zur Bestimmung der Gesamtmenge verbrennbarer organischer Substanzen in hydrophoben Abluft-Systemen). Text in German. Wasser Luft Betrieb, 15(5):177-179, 1971. 12 refs.*

Organic compounds in waste gases are sometimes difficult to determine accurately if the gases are moisture laden or even saturated with water vapor; the silica gel method commonly used to determine the entire combustible organic matter loses its accuracy and high sensitivity. An apparatus was developed which removes moisture from waste gases through condensation and it permits differentiation between waste gas components in the aqueous phase and those remaining in the gas phase. Determination of the total carbon concentrations in the gaseous phase is carried out through desorption on silica gel tubes by the familiar method. The condensate obtained must be analyzed separately preferably by the Egli-Schaer method. This method also required modification because of inaccuracies when, for instance, oil droplets are present which do not combine with the water-vapor phase. Therefore, sampling is carried out by condensing the waste air sample directly in a round-bottom flask within a vessel filled with dry ice. Without transfer of the condensate, the flask then used for analysis by the EgliScheer method. The method was satisfactorily applied to determine the total carbon content in waste air from potato frying with subsequent waste gas cleaning.

12900 APTIC NO. 30239

Boewing, H. -A. and Th. Gast

GRAIN SIZE ANALYSES IN THE RANGE OF SMALL DIAMETER WITH A NEW SEDIMENTATION CONCENTRIFUGE. *(Korngroessenanalyse im Bereich kleiner Durchmesser mit einer neuen Sedimentationszentrifuge). Text in German. Chem. Ing. Tech., 43(8):523-528, April 1971. 7 refs.*

A sedimentation centrifuge is described that permits reliable, rapid, and automatic measurements of grain size distribution in the finest range. The unit is suitable for grain size determinations of soot, metal mists, pathogenic dusts between 5 and 0.1 micron, dyes, and pigments. The measurement principle is based on the determination of the pressure caused by the solid fraction of an originally homogeneous suspension in the centrifugal field. The sedimentation centrifuge has an inner diameter of 20 mm and a measurement path 50 mm long. It is made of acrylic glass, driven by DC motor with a power of 45 w, and can operate with 670, 950, and 1350 rpm. It can be equipped with a thermostat. The unit was tested 20 ccm suspension having a solid content of 0.5% by volume. The zero point stability better than one percent. The upper limit is 10 micron, the lower is 0.1 micron. The results can be reproduced satisfactorily. In the range between one to 10 micron, the results could be confirmed by analyses according to Andreasen.

12901 APTIC NO. 30442

Bol, Jan, Josef Gebhart, Christa Roth, and Gerhard Wurzbacher

ANALYSIS OF COLLOIDAL AIR AND WATER POLLUTION BY LIGHT SCATTERING. *Battelle Inform. (Frankfurt am Main), p. 23-29, Aug. 1969. 6 refs.*
NTIS: N70-42557-562

Of the methods for measuring particle concentrations and size, those based on the scattering of light have the advantage that they do not require any mechanical interference with the aerosol (or colloidal system); it is therefore possible to measure the particle in the suspended state. This eliminates measuring errors, which may be encountered with other methods using deposition of the particles and time consuming counting under the microscope. In particle-size analysis, the light scattering method has the additional advantage that a large number of particles can be measured within a short time. Rapid changes in the properties of the aerosol can therefore be detected. The theoretical basis for examining particles by scattering light is reviewed. Design of particle-size spectrometers is considered, as well as the measurement of the particle concentration.

12902 APTIC NO. 30202

Brink, D. L., A. A. Pohlman, and J. F. Thomas

ANALYSIS OF SULFUR-CONTAINING AND SULFUR-FREE ORGANIC PRODUCTS FORMED IN KRAFT BLACK LIQUOR PYROLYSIS. *Tappi, 54(5):714-720, May 1971. 8 refs.*

A dual flame ionization-microcoulometric titration system was designed and used to detect all organic compounds and sulfur containing organic compounds, respectively, as these kraft black liquor pyrolysis products were eluted from a gas chromatograph. A sulfur specific detector in a gas chromatographic system is needed for the analysis of such mixtures. A preparative gas chromatographic system was used to isolate the major pyrolysis products in sufficient purity to permit subsequent analytical studies by mass spectrometry. The compounds identified include: methyl mercaptan, dimethyl sulfide, dimethyl desulfide, benzene, toluene, xylenes, phenol, anisol, cresols, and xylenols. The identification of additonal sulfur-containing compounds required the development of a fractionation technique designed to isolate these products from the sulfur-free components, which are present in substantially higher concentrations. The technique developed was shown to be effective by the dual FID-MCT chromatographic system. The separated sulfur-containing products were then isolated in sufficiently pure form to permit mass spectrometric studies. Some preliminary results of these studies are reported. The effect of temperature on the formation of pyrolysis products is also shown by using the dual chromatographic system. (Author summary modified)

12903 APTIC NO. 30735

Buijtenen, C. J. P. Van

A SIMPLIFIED SLIDE RULE FOR THE DETERMINATION OF DOWNWIND SAFETY LIMITS FOR TOXIC VAPORS. *(Een vereenvoudigde rekenschijf voor het bepalen van benedenwindse dampveiligheidsgrenzen). Text in Dutch. Rijksverdedigingsorganisatie TNO, Rijswijk (Netherlands), Chemisch Lab. 20p., May 1970. 4 refs.*
NTIS: N71-13432

A circular slide rule developed in 1962 for the calculation of a safety range downwind from an instantaneous source of toxic gases, has been simplified. Simplification has been accomplished at the expense of accuracy, but the loss is only slight. The simplification consists of replacing a continuously variable stability parameter with a series of stability categories, and of introducing a correction factor for source length by another method. The maximum error in the safety range is +25%, and this occurs only in isolated cases. The 5 stability categories used are designated as very stable, stable, neutral, unstable and very unstable.

12904 APTIC NO. 30684

Castello, Gianrico

ANALYSIS OF TRACES OF CONTAMINANTS IN BREATHING OXYGEN WITH A HELIUM DETECTOR AND AN ELECTRON CAPTURE DETECTOR. *J. Chromatog., 58(1):117-125, June 10, 1971. 16 refs.*

A method is described which allows the determination of a few parts per billion of impurities in breathing oxygen for pilots and for therapeutic purposes. Gas chromatography allows the analysis of methane and other hydrocarbons, carbon monoxide, carbon dioxide, nitrous oxide, nitrogen, hydrogen, and chlorinated hydrocarbons. These compounds are detected by a helium detector and an electron capture detector. For calibration, standard mixtures, containing known amounts of contaminants-diluted in oxygen were used. The sensitivity of the system to all the gases analyzed is shown in tabular form. The total analysis of a sample of oxygen for breathing or therapeutic use can be completed within 15 min. The sensitivity data are very satisfactory if compared with the purity required by the regulations. The method is therefore sufficiently sensitive and rapid for routine analysis of contaminants in breathing oxygen. It can be applied to the analysis of air pollutants and to the determination of the purity of gases.

12905 APTIC NO. 30605

Doering, Klaus-Eberhard and Juergen Hartmann

DETERMINATION OF TRACES OF OXYGEN, NITROGEN, METHANE AND CARBON MONOXIDE IN PURE PROPYLENE BY THE METHOD OF FRONTAL ENRICHMENT. *(Zur Bestimmung von Spuren Sauerstoff, Stickstoff, Methan und Kohlenmonoxid in Reinpropylen nach der Methode der Frontalanreicherung). Text in German. Chem. Tech. (Berlin), 23(4-5):278-279, April-May 1971. 4 refs.*

A method analyzing trace quantities of oxygen, nitrogen, methane, and carbon monoxide in propylene by frontal enrichment and subsequent elution chromatography uses a modified GACH-21 instrumen consisting essentially of an enrichment column containing silica gel as absorbent and a separation column filled with molecular sieve pellets 13X (diameter 0.2-0.8 mm). The trace quantities of O2, N2 CO, and CH4 which have a much lower affinity to the absorbent than propylene are concentrated in the adsorption column by frontal displacement and reach the separation column. Elution is accomplished by the carrier gas (hydrogen) in the order of O2, N2, CH4, and CO. The trace gas quantities are determined from peak heights after calibration of propylene mixtures with known quantities of trace gases. The propylene retained by the silica gel in the adsorption column is desorbed at 280 C by a stream of hydrogen in 20 min. One to five ppm trace gas quantities can be determined by this method with an accuracy of plus or minus five to eight percent.

12906 APTIC NO. 30901

Ebens, Rinze and Peter Bernard Meyer

12907 APTIC NO. 30324

Fett, Walter and Erdwin Lahmann

TO THE EVALUATION OF THE IMMISSION IN THE VICINITY OF A SINGLE SOURCE. *(Zur Bewertung der Immission in der Umgebung einer Einzelquelle). Text in German. Staub, Reinhaltung Luft, 31(5):200-205, May 1971. 5 refs.*

A method for evaluating emissions in the vicinity of a single source is described which is inexpensive and yields representative results. For a single source, a polar arrangement of measuring stations is necessary. The measuring stations are established as close as possible to the points of intersection between the eight main wind directions emanating from the emission source and circles are drawn around the source. The position of the circles is chosen in coordination with the height and size of the source. The smallest radius is determined by the limit of the plant premises, the largest by the point of lowest expected emission concentrations. Between these two circles at least two others should be planned. At an emission sources close to the ground, the radii are equally distant from each other. The samples are taken mainly in the lee of the source. The concentration which exceeds with a 2.5% probability, is selected as an emission parameter. This method was used to determine the hydrogen sulfide emissions in the vicinity of a viscose plant. Within a period of six months, 458 samples were obtained in a measurement grid which was formed by the eight main wind directions and by circles with the radii, 250, 500, 750 and 1000 m. The maximum emissions were found in the immediate vicinity of the source, which indicates that a considerable amount of low-level emission occurs. The greatest advantage of the method lies in the comparability of the measured values.

12908 APTIC NO. 30844

Forsyth, R. H. and W. A. Curby

THE USE OF A MODIFIED DIFFERENTIAL CONDUCTIVITY PARTICLE COUNTER TO DETERMINE DIFFERENCES IN THE SIZE-DISTRIBUTION PROFILES OF PROLIFERATING MICROORGANISMS. (FINAL REPORT). *Cambridge Technology, Inc., Newton Upper Falls, Mass., Army Contract DADA17-70-C-0038, Rept. 5029-4, 92p., Nov. 13, 1970.*

NTIS, DDC: AD716005

Particle size distributions in air pollution studies have been determined by an instrument system consisting basically of a differential conductivity particle counter (a sensor operating on the Coulter principle) interconnected with a multichannel analyzer. In the present study, the feasibility of using the instrument system as a tool for differentiating particle shapes in microbiological populations was studied. Preliminary experiments demonstrated that the system eliminates the long growth periods needed in classical microbiology analytical methods, has a higher sensitivity, and can be used with mixed microorganism populations. Shape discrimination in the one to 100 micron range appears possible. The system described provides output data in a form compatible with computer manipulation and storage.

12909 APTIC NO. 30188

Frei, R. W. and H. Zuercher

A QUANTITATIVE IN SITU FLUORIMETRIC STUDY OF ACRIDINE AND 5,6- BENZOQUINOLINE AFTER THIN-LAYER CHROMATOGRAPHIC SEPARATION FROM SIMILAR AIR POLLUTANTS. *Mikrochim. Acta (Vienna), no. 2:209-219, 1971. 11 refs.*

Acridine and 5,6-benzoquinoline were studied extensively by in situ fluorimetry in an attempt to evaluate the potential of this method for quantifying mixtures of polynuclear aza heterocyclic hydrocarbons in polluted air samples. The stabilities of naturally fluorescing acridine and 5,6-benzoquinoline were found to be sufficient for quantitative work if processed in the dark. Between 4 and 6% rel SD and 2 and 3% rel SD respectively, are reported for these two compounds after one-dimensional chromatography. Improvements of 3 to 5% rel SD were achieved with the use of an internal standard in conjunction with two dimensional chromatography. Spraying with trifluoroacetic acid to render nonfluorescent zaza arenes such as phenazine fluorescent did not produce a sufficiently stable derivative to permit quantitative analysis. Visual and instrumental detection limits of 0.005 microgram/spot are reported for this method, with linear calibration curves of fluorescence vs. concentration extending up to 0.5 microgram/spot. The optimum range of analysis is reported to be 0.1 to 1 microgram/spot. (Author abstract)

12910 APTIC NO. 30907

Fukui, Shozo

MEASURING METHODS FOR NOXIOUS SUBSTANCES IN THE ATMOSPHERE. *(Kukichu no yugaisei busshitsu no sokutei hoho). Text in Japanese. Bunseki Kiki (Analysis Instr.), 9(7):27-39, July 1971.*

Methods of sampling and analyzing noxious atmospheric substances are discussed. Both wet and dry sampling methods are summarized. Wet methods include gas absorbents absorption tubes and stack gas sampling. Dry sampling utilizes a syringe or vacuum bottle, plastic bag, solid reaction tube filter, or cooling condensation. Procedures involved in the chemical analysis of samples are reviewed at length. Included are the preparation of reagents, sampling methods, test procedures, and technical remarks. Atomic absorption spectrochemical analysis is used to determine zinc. The indophenol and Nessler s reagent method are employed in the analysis of ammonia. Acetone is detected by gas chromatography, sulfides by the barium chloranilide and arcenazo methods, carbon monoxide by the detection tube method and gas chromatography and hydrogen chloride by the mercury thiocyanide method.

12911 APTIC NO. 30594

Ghazi, A. and J. J. Becker

MEASUREMENT OF TOTAL ATMOSPHERIC OZONE USING SKY RADIATION. *J. Appl. Meteorol., 10(3):545-554, June 1971. 12 refs. (Presented at the AMS-IMS International Conference on Meteorology, Israel, Nov. 30-Dec. 4, 1970.)*

Instead of measuring total ozone by observing the direct sun or at the zenith, photometric measurements of sky radiation were made at the solar vertical. The newly developed spectrophotometer uses filters and a photomultiplier as the light source. Applying a theoretical model of the atmosphere as a primary reduction parameter, the measured spectral intensities of skylight were compared to deduce the total amount of ozone. Preliminary results showed a fair correlation with the values obtained by the standard spectrophotometer. To eliminate subjective effects, the measurement and evaluation procedure should be completely digitized. This, averaging, smoothing, and ratio making may be done by computers. In this way, the accuracy and density measurements would be increased, and the effects of haze and clouds parameterized. Such measurements would then be of significance in synoptic meteorology. (Author abstract modified)

12912 APTIC NO. 30307

Goecke, Dieter

ACOUSTIC GAS ANALYSIS THROUGH MEASUREMENT OF SOUND DISPERSION, PART II – MEASUREMENT METHOD. *(Akustische Gasanalyse durch Messung der Schalldispersion, Teil II -- Messverfahren). Text in German. Arch. Tech. Messen, no. 3:41-46, March 1971. 23 refs.*

Acoustic gas analyzers are still in the experimental stage. Their great advantage is that they measure gas concentrations as small as 0.01 ppm at a measuring chamber volume fo 40 ml. Three measuring principles are suitable for acoustic gas analysis. The resonator method, which operates in the range of audible sound, requires relatively large measuring chambers. Interferometric methods are most frequently used. Usually the dual transducer interferometer is employed. The measurement of the speed of sound is based on electric phase measurements which can be carried out with great accuracy. The third method, the pulsed method, has never been used with gases. It is based on pulsed sound transmission. Two measuring units based on the latter principle were developed. For transducers, membrane vibrators were selected which are electrostatically excited. The measuring chamber of the units has a volume of 0.25 l. Two condenser transducers are installed at a 100 mm distance in a tube with an inner diameter of 55 mm. The two units were tested with six different gas mixtures, one an air/carbon dioxide mixture. The accuracy of analysis was 1%, the duration of the analysis is 50 microseconds. The method is suitable for analysis of elementary and nonelementary gases. The great disadvantage of this method lies in the shortcomings of the transducer.

12913 APTIC NO. 30729

Gordon, Ernest S., Daine C. Maxwell, Jr., and Nelson E. Alexander

ELECTRONIC INSTRUMENTATION OF A DEVICE TO AUTOMATICALLY COUNT AND SIZE PARTICLES IN A GAS. *IRE (Inst. Radio Engrs.) Trans. Ind. Electron., 1956:12-22, 1 ref.*

The electronic instrumentation as aerosoloscope, a device for automatic counting and sizing of aerosol particles, is described. This device has wide potential application in analyzing dusts, fogs, and smokes, as it relieves the chemists of the tedious and time-consuming job of counting the particles collected on a slide under the microscope. In one operation, the aerosoloscope detects particles of a nominal size range of from one to 64 micron in diameter and classifies them into 12 adjacent size groups within this range. It counts and classifies at a maximum rate of 100 particles per second and accepts aerosols of concentrations up to 10,000 particles per cu m. Light scattering is utilized for particle detection, as a thin aerosol stream intersects a high intensity light beam and a portion of the light energy scattered by the particles is received by a photomultiplier phototube. The resulting electrical pulses are amplified and classified by size into the 12 groups by a unique pulse height discriminator. Glow-transfer tubes and registers are used to count the pulses within the various groups. Dynamic range problems and system noise are briefly discussed.

12914 APTIC NO. 30582

Gregory, P. H.

AIRBORNE MICROBES: THEIR SIGNIFICANCE AND DISTRIBUTION. *Proc. Roy. Soc. (London), Ser. B., vol. 177:469-483, April 27, 1971. 48 refs.*

Aerobiology is the study of airborne viruses, bacteria, protozoan cysts, spores of fungi and lichens, small algae, plant spores, and pollen grains. The cascade impactor began a new generation of equipment for microbial air sampling. The Hirst automatic volumetric spore trap, the Andersen sampler, electrostatic high volume samplers, and irrigated cyclone separators are useful tools for studying the air spora. The results of sampling on a summer day, showing the changes in aerial microorganisms, are given. Under most conditions, fungus spores and pollens dominate the air spora. This group is best studied by systematic, continuous sampling. Despite the need for continuous sampling, discontinuous, but systematic, air sampling has established that circadian fluctuations occur in bacterial concentrations. Occasional, or spot, sampling has also shown that protozoa, mosses, and algae occur regularly in the air. The air spora seem to originate at the earth s surface. Some come from the soil, fresh water, or oceans, but most from vegetation and living or dead organisms growing in the air/earth interface. There is nothing to indicate the existence of a true aerial plankton. Although much of the airborne material liberated near ground level is deposited within 100 m of its source, a proportion is lifted by mechanical turbulence or convection into the upper air for long-distance dispersal. The problems of studying the viability of airborne microorganisms are discussed. The significance of aerial microbes in such diseases as asthma, farmer s lung, and other respiratory diseases and in-plant diseases is also discussed.

12915 APTIC NO. 30579

Cross, R. A. and S. C. F. Robinson

AN AUTOMATIC HIGH SPEED ANALYSER FOR GASES. *Chem. Ind. (London), no. 24:678-680, June 12, 1971. 3 refs.*

A chromatographic device has been developed to analyze gas mixtures whose compositions vary sufficiently to require analysis every few seconds. The instrument has been designed to function automatically and provide repetitive analyses of gas mixtures in 10 seconds or less. The analyzing and sampling equipment may be remote from the control and recording systems, allowing sampling lines to be kept short. A number of probes are connected to the sample manifold and solenoid valves. Opening a valve allows a sample from the corresponding probe to be passed continuously to the analyzer unit. Here the sample passes through a piston-type injection valve. Carrier gas admission to the analyzer is controlled by a pressure regulator and gauge. The flow is split between the sample and reference chambers of the detector, using a restrictor, to compensate for the pressure drop across the sample valve and column. The gas sampling valve is operated by two process timers. The katharometer power supply and control unit is located near the recording equipment. The output signal is fed directly to an ultraviolet recorder. Calibration and determination of component concentration are based on peak height measurement. The high speed analyzer has been successfully used in a number of applications.

12916 APTIC NO. 30290

Guicherit, R.

AUTOMATIC MEASUREMENT OF POLLUTANTS. *(Het automatisch meten van luchtverontreinigende stoffen). Text in Dutch. Chem. Weekblad, 67(9):18-23, Feb. 26, 1971. 12 refs.*

Types of instrumentation for use in automatic measurement of air pollution from carbon monoxide, sulfur dioxide, nitrogen oxides, ozone, hydrocarbons, soot, dust, heavy metals such as lead, and polynuclear aromatic compounds such as 3,4-benzopyrene are described, including instruments for colorimetric, potentiometric, and physical-chemical detection. The measurement of aerosols is not discussed since automatic readings for this type of pollutant is considered beyond the competence of present technology. The tendency in developing measuring methods has been from exclusive use of wet chemical processes (colorimetry) to electrochemical methods to the exclusive use of physical measuring methods. Data are given illustrating the results of measurement by such methods, including a comparison of pollutants created by human activity with those from natural emission sources. Human activities are responsible for the release of more than 200 million tons of CO per year, compared with 30 million from natural sources. From human activities also produce 58-70 million tons per year of SO2 about 4-5 times as much as nature normally produces. For all other pollutants, the human output was lower than natural emissions. Total emissions in the Netherlands and in the U. S. are compared, excluding natural sources. In both countries, automotive traffic is responsible for 90% of the CO emissions. In the U. S., automotive traffic is responsible for 63% of hydrocarbon pollution and 46% of the nitrogen oxides, compared with 45% and 15%, respectively, in the Netherlands.

12917 APTIC NO. 30254

Gushchin, G. P.

ON THE METHODICS OF AEROSOL CORRECTION IN THE MEASUREMENT OF OZONE CONTENT IN THE ATMOSPHERE. *(K metodike vvedeniya aerozol noy popravki v resul taty izmereniya obschchevo soderzhaniya atmosfernogo ozona). Text in Russian. Tr. Gl. Geofiz. Observ. (Leningrad), no. 237:69-80, 1969. 6 refs.*

Routine spectroscopic measurement of ozone concentration in the air is done under the assumption that absorption of light by aerosols i independent of wavelength. When the assumption is not fulfilled (which is mostly the case), the aerosol correction has to be introduced into ozone determinations. Determination of the aerosol correction is done on the basis of measurements of intensity of direct solar radiation in three parts of the spectrum. An expression was derived for dependence of optical thickness of aerosols on wavelength, which contains two parameters. The ratio of optical thicknesses of aerosols at two wavelengths is a function of these wavelengths and parameter n (Yunge parameter) only. Some other equations used in the calculation are presented. Calculation of aerosol correction is shown in detail. Correction for the change in effective wavelength of the spectral system of an instrument is included. Suggestions for an ozonometer calibration are given.

12918 APTIC NO. 30300

Habel, K.

EXPERIMENTS FOR SEPARATION OF GASEOUS AND SOLID FLUORINE COMPOUNDS IN EMISSION MEASUREMENTS. *(Versuche zur Trennung von gasfoermigen und festen Fluorverbindungen bei Emissionsmessungen). Text in German. VDI (Ver. Deut. Ingr.) Ber., no. 164:85-89, 1971.*

In the last 20 years, the main area of interest with regard to emissions originating from iron and steel industries has been dust and sulfur dioxide. A variety of methods of measurement were developed and perfected. The handling of fluorine emissions, however, has been dealt with only more recently. It confronts the researchers with problems which are substantially different from the SO2 testing, largely because of the chemical properties of fluorine, the most reactive electronegative element. Due to its secondary valences, it easily forms several addition and complex compounds and combines readily with other elements to form stable compounds. Methods are available for the analytical determination of the overall fluorine content in solid and liquid materials, even in smallest concentrations. However, in view of the different behavior of gaseous and solid fluorine compounds, it appears desirable to separate the two. In this connection, a test set-up for waste gases was developed which includes a filter of quartz glass fiber material for retaining the dust particles. The size of the filter is MF150, and it will retain particle sizes from one micron up. For gas absorption, the waste gas stream passes through two or more impingers. Also included in the flow system is a heating mantle which surrounds the filter which dries the gas mixture and keeps the filter dry, the reason being that at increased humidity, gaseous fluorine compounds are being partly adsorbed by the components of the test system. This has to be counteracted to avoid greatly incorrect measurement results. Since the rate and volume of gas flow is being recorded by a gas meter, the values of fluorine concentrations established by analysis can be readily converted and expressed in mg/cu m of the tested gas.

12919 APTIC NO. 30826

Halsey, H. W. and E. L. Gray

DETERMINATION OF ATMOSPHERIC TRANSMISSIVITY FROM LASER BACKSCATTER MEASUREMENTS. *General Electric Co., Philadelphia, Pa., Space Sciences Lab., Rept. R66SD44, 47p., 1966. 14 refs.*

NTIS, DDC: AD 715550

The application of the single ended telephotometer provides a technique for obtaining error free data on atmospheric transmissivity. The experimental results obtained with a ruby laser used in such an application support the analytical result and indicate that atmospheric transmissivity can be predicted by examining the light backscattered from a pulsed light source. The results of the experimental work are plotted graphically with the predicted results and the two sets of data in good agreement. A logical extension of this work would be to utilize a four color laser radar operating at 1.06, 0.6943, 0.5300, and 0.3472 micron, in order to determine particle size distributions of the atmospheric aerosols at various times and locations. The results of this work would be a series of mean continental aerosol which could be selected for use based upon observable conditions. Sufficient data were also collected which indicate that atmospheric density to altitudes of at least 100 kilometers can be measured with the ruby laser radar. (Author summary modified)

12920 APTIC NO. 30754

Hanst, Philip L. and John A. Morreal

A WAVELENGTH-SELECTIVE, REPETITIVELY PULSED CO2 LASER. *National Aeronautics and Space Administration, Cambridge, Mass., Electronics Research Center, 22p., April 1968. 6 refs.*

NTIS: N71-12574

A carbon dioxide laser has been constructed and operated with two gas absorption cells built into the cavity. The first of the cells contains a gas which controls the wavelength of emission, while the second contains a gas which forces the laser into a high-frequency pulsed mode of operation. Details of the laser construction are given. The pulsing and wavelength shifting are accounted for by the spectroscopic and kinetic properties of the gases. The proper choice of absorbing gases has produced high powered pulsed operation at various wavelengths between 9.08 and 10.6 microns at repetition rates of up to 100 kHz. Applications of the wavelength-selective, repetitively pulsed laser include studies of non-linear optical effects and the detection of atmospheric pollutants such as sulfur dioxide and ozone. (Author abstract modified)

12921 APTIC NO. 30846

Hanst, Philip L.

SPECTROSCOPIC INSTRUMENTATION FOR AIR POLLUTION MONITORING. *Preprint, Environmental Protection Agency, Raleigh, N. C., Air Pollution Control Office, 2p., 1970 (?).*

Spectroscopic instrumentation for air pollution monitoring can be divided into two types: instruments for monitoring emissions from stationary and mobile sources, and instruments for monitoring ambient air quality. The greater sensitivity required for ambient air measurements may be acquired through auxiliary optical systems, such as folded path cells, while the actual spectroscopic detection instrument remains the same. Types of instruments available are the grating and prism spectrometers, the non dispersive correlation instruments which use coded filters in the focal plane, the scanning Michelson interferometers, the narrow band radiometers, and the polychromators. Atmospheric spectroscopy involves all visible wavelengths. The most useful spectral region is the infrared. However, if Raman scattering techniques can be developed for pollution measurement, the ultraviolet region will become more important. Factors to be considered in evaluating the performance of spectroscopic instruments include discriminating power, information content of output, speed, versatility, reliability, size, cost, and convenience. Discriminating power, information content, and speed are interdependent. These three properties are derived from the instrumental properties of throughput, resolution, and multiplexing. Two non-dispersive measurement techniques show promise for future development. The first is the infrared non-dispersive correlation method. The second uses the absorption of selected laser lines as a measure of the presence of pollutant in an air sample.

12922 APTIC NO. 30632

Hartmann, Karl

A NEW FLAME IONIZATION GAS ANALYZER. *(Ein neuer Flammenionisations-Gasanalysator). Text in German. Wasser Luft Betrieb, 15(6):211-213, June 1971.*

The flame ionization detector operates on the principle of producing an ion flow through the application of an electric field to a hydrogen flame. Upon the addition of hydrocarbons to this flame, the ion flow rises proportionally to the quantity of hydrocarbons added per time unit. For the operation of the hydrogen, the gas, which is measured with the corresponding hydrocarbon content, and scavenging air are passed to the burner. About 20 to 30 ml hydrogen is needed per hour. The thoughput of scavenging air must be large enough so that burning of the flame is guaranteed and condensation in the waste gas pipe is avoided. With the new flame ionization detector the pressure for the scavenging air is adjusted with a precision manual switch. All components, with the exception of the burner, are accommodated in a thermostat which maintains a constant temperature of 45 C plus or minus 0.1 C. All supply lines between the pump and filter and the filter and burner are of corrosion proof steel. To ensure safety, the pneumatic hydrogen regulator is equipped with a double membrane. Electric ignition of the flame and calibration through pressing a button make the operation of the unit simple. The main casing contains the pneumatic part with a thermostat, the electronic part in the same thermostat, and the burner with a separate thermostat (less than 100 C). In the additional casing the pumps and filters are accommodated. The unit is particularly suitable for measuring the waste gases of combustion engines.

12923 APTIC NO. 30400

Herrmann, R.

FLAME SPECTROMETRY METHODS IN BIOPHYSICS. *(Flammenspektrometrische Methoden fuer die Biophysik). Kerntechnik, 12(6):254-260, June 1971. 18 refs. (Presented at the German Biophysics Association, Annual Meeting, Giessen, West Germany, Oct. 15, 1970.)*

Three flame spectrometric methods the emission method, absorption method, and fluorescence method, are available for the determination of cadmium, magnesium, and zinc in biological starting material. There is no great difference between the emission and the absorption method, except for a so-called background emitter in the absorption method, which is located behind the flame as seen from the monochromator. In the fluorescence method, a different apparatus is used as compared to the absorption method. The background emitter is not located in the axis of the optical system flame/monochromator/photocell. A fluorescence emission radiation is uniformly emitted in all directions. The emission method is the simplest of the three. The absorption method is best suited for cadmium, magnesium, and zinc determination. The emission method can be more easily adjusted by varying the amplification gain, to very large concentration differences in the starting material, e.g., for detection of trace elements and for toxicological investigation. The emission and absorption methods are mutually complementary; the fluorescence method still requires technical improvement.

12924 APTIC NO. 30662

Hochrainer, D.

A NEW CENTRIFUGE TO MEASURE THE AERODYNAMIC DIAMETER OF AEROSOL PARTICLES IN THE SUBMICRON RANGE. *J. Colloid Interface Sci., 36(2):191-194, June 1971. 6 refs.*

A device for measuring the aerodynamic diameter of aerosol particles which eliminates the Coriolis effects on gas motion in the centrifuging chamber is described. The aerosol enters the instrument at the center of rotation and divides itself into two fractions, which flow through two radial channels to a thin annulus. The larger fraction passes through the first channel and is rid of particles of a certain aerodynamic diameter by centrifugation deposition during flow through the first half of the annulus. The smaller fraction enters the annulus through the second channel as a small addition to the tangential flow of clean air. The particles are centrifuged though the clean air flow and deposited over the last half of the annulus. Particles below a certain aerodynamic diameter are carried away with the air. Deposits obtained with this instrument can be used to obtain the distribution in the aerodynamic diameter in the range between 0.2 and 1.1 millimicron, with the use of proper flow rates and calibrations. For aerosols containing particles of distinct sizes, such as latex aerosols, the deposit is in the form of distinct, straight lines.

12925 APTIC NO. 30622

Hogan, Austin

EVALUATION OF A SILICONE ADHESIVE AS AN AEROSOL COLLECTING MEDIUM. *J. Appl. Meteorol., 10(3):(3):592-595, June 1971. 1 ref.*

An ideal adhesive for sampling natural aerosols should be mass stable, insoluble in water, capable of remaining tacky after long exposure to sun, rain, snow, and wind, capable of adhering to many materials, adaptable to microsocpy, easy to apply, and nontoxic. General Electric Silicone Resin SR-516 was selected for field evaluation, after preliminary laboratory tests indicated that it has all of these desirable qualities. It was a suitable adhesive for coating aerosol collecting foils which must be exposed to ambient weather conditions for periods of approximately 30 days. It is especially suited to dense sampling networks because high quality coatings can be applied with a camel s hair brush on a near mass production basis. The solvent is easily removed, along with water, by baking for a few hours at 75 C. No damage is done to the tackiness of the coating by prolonged exposure to these temperatures.

12926 APTIC NO. 30374

Hoshika, Yasuyuki

PROPOSAL ON OBNOXIOUS ODOR SURVEY ACT (NO. 1). *(Akushu kogai chosaho ni kansuru teian). Text in Japanese. Akushu no Kenkyu (Odor Research J. Japan), 1(4):39-47, March 1971.*

Obnoxious odor cannot be merely a matter for scientific investigation. Even when a very small amount exists (e.g., 0.0001 ppm of methylmercaptan) it is detected by men gives an unpleasant feeling. Medico-physico-chemical evaluation is an important factor. Although the Odor Survey Act covers the physiological phenomenon of the sense of smell, the actual emission of odors by factories, the mechanism of generating odor causing material and the relationship between the factories and the inhabitants in a neighborhood, almost all the episodes must be dealt with case by case, and so methodology is established. There is no methodological approach to the odor problem because it is vague, difficult to define, and there is no appropriate method for measurement. The atmosphere, water, and filthy materials which cause odor pollution contain chemical substances in a certain combination and in a certain concentration. The only possible approach at present is to sort out the expression of people who smelled the odor (including specialists of smells), confirm the substances by instrumental analysis, approximate the concentration based on instrumental quantitative and qualitative analysis, and prepare a similar mixture of known substances to fingerprint the odor. The inhabitants reaction must be an indicator of the effectiveness of an odor eliminating device. The elimination of substances at the inlet and outlet of odor-eliminating device cannot soley be depended upon. Monitoring should be done at as many places as possible; 30, 50, 100, 200, 300, 500, 1000 m with 5-10 deg angles and at more than 10 other spots, and repeating the checks three to four times. The instruments used would be a gas chromatograph, infra-red visible, and ultra-violet spectroscopic analysis, thermo- analysis and mass spectrometry. Several instruments should be combined. For the sensory test, the ASTM method, the smelling window-odorless-chamber methods, and the Kinoshita method are applied. It is very difficult to establish emission standards on obnoxious odors.

12927 APTIC NO. 30707

Hwang, Jae Y., Paul A. Ullucci, and Charles J. Mokeler

TRACE ANALYSIS OF ATMOSPHERIC POLLUTANTS BY SOLVENT EXTRACTION– FLAMELESS ATOMIC ABSORPTION SPECTROMETRY. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 17p., 1971. 6 refs. (Presented at the Air Pollution Control Association Annual Meeting, 64th, Atlantic City, N. J., June 27-July 3, 1971.)*

Trace elements of silver, cadmium, zinc, and lead in atmospheric particulate samples were determined by solvent extraction flameless atomic absorption techniques. Air particulate samples were collected on organic membranes by a low volume air sampler. The membranes with the samples were pretreated with acetone before acid extraction. Sample solutions, thus prepared, were further extracted into organic solvents. The final organometallic complexes in organic solvents were then dried, pyrolyzed, and atomized in an enclosed chamber under an inert gas atmosphere for atomic absorption measurements. To improve the accuracy of the analysis, a thorough investigation into the chemical interferences was made and the interferences were compared between the present and conventional atomic absorption techniques. This technique is simple and runs with good sensitivity and precision. It is ideal for the trace analysis of atmospheric particulate samples for a short-term variation study. (Author abstract modified)

12928 APTIC NO. 30689

Ishiguro, Tatsukichi Isao Kobayashi, Atsuko Kobayashi, Yoshihiro Shigeta, Yasuyuki Hoshika, Tomohiko Ishiguru, and Shosaburo Dobashi

ON COMPARISON OF VARIOUS ODOR TESTS BY SMELL PANEL. *(Kanno shiken kakubo no hikaku ni tsuite). Text in Japanese. Tokyo- To Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), vol. 2: 78-81, March 1971. 6 refs.*

Three representative odor test methods using a smell panel were compared for their effectiveness: the odorless chamber with a smelling window method; the injector method; and the shuken kinoshita-shiki odor test method. The panel consisted of experts from established perfume firms. Two kinds of test samples were used, one from the exhaust gas of a drier used in a waste fish processing plant and the other from an animal bone treatment plant. The odor concentration expressed by rate of dilution required to dilute the sample with clean air to the threshold value of the odor was measured. For the sample from the fish treatment plant the value was 10,000-400,000 when tested by the odorless chamber method. The odor concentration from the animal bone treatment plant was 15,000-40,000 for a sample from a direct fire type rotary drier and 150,000-200,000 for a sample from a conventional box type drier. With the injector method, the fish waste odor was 30,000-50,000 while the animal bone odor was 750-200,000. Under the shuken kinoshita-shiki odor test method, it was 200-800 for the fish waste and 150-500 for the animal bone. Whereas the first two methods dilute the sample with clean air, the third uses water so that water-soluble substances contained in the sample, if any, may dissolve in the dilutent to change the odor. A second problem is the difference in sampling time among the three methods and the time that elapses from the time of sampling to the time of test by the panel. While it takes longer to sample with the kinoshita method, the sample remains comparatively stable. With the odorless chamber method, a longer time is required between the time of sampling and that of test, so that some measures should be taken to shorten the period. All three methods require some improvements. A better odor test method may be a combination of the injector and odorless chamber methods, using the former as the standard method and the latter as supplemental.

12929 APTIC NO. 30909

Jaenicke, Ruprecht

THE DOUBLE STAGE IMPACTOR, A FURTHER EXPANSION OF THE IMPACTOR PRINCIPLE.

(Der Doppelstufenimpaktor, eine weitere Anwendung des Impaktorprinzipes). Text in German. Staub, Reinhaltung Luft, 31(6):229-236, June 1971. 9 refs.

A new impactor (DSI) for measuring aerosol size distribution is described. The impactor consists of five units each with two identical impactors in a row. The impactors are tightly vacuum sealed with each other through clamps and O-rings. They differ only in the width of their apertures. Because the impactors are uniformly dimensioned, calibration is simplified. Directly opposite the nozzle ends of the impactors in the conical section of the following impactor are the collection plates. The plates, simple microscope lenses, are coated with a highly viscous, transparent, and particle-free silicon oil. Springs are used to press the measuring plates toward the nozzle ends. At some distance from the nozzle end, they are fastened into position. Problematic size distribution in the light microscope (range 0.00005 to 0.00004 cm radius) is avoided by counting only particles on the second stage. The complete size distribution is found with the aid of a computer program. The impactors were calibrated with polystyrole spheres of known density and size distribution. The calibration lead to an extension of the impactor theory, making use of the improved Stokes law for drag coefficient.

12930 APTIC NO. 30282

Kanamori, Shozo and Toshiichi Okita

DETERMINATION OF ATMOSPHERIC AMMONIA BY PYRIDINE-PYLAZOLONE METHOD IN COMPARISON WITH NESSLER S METHOD.

(Nesuraho oyobi pirijin pirazoronho niyoru taikichu ammonia nodo no hikaku sokutei). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(2):277-283, April 1971. 10 refs.

The Nessler and pyridine-pylazolone (p-p) procedures for determining ammonia were compared. The p-p procedure was found to be free of interference from major air pollutants and to give a considerably lower ammonia level. Procedures for sampling ammonia were also tested. The efficiency of sampling into 1/50 N sulfuric acid decreased with prolonged sampling, but a glass fiber filter impregnated with sulfuric acid provided high sampling efficiency even at flow rates as high as 15 l/min. Atmospheric ammonia concentrations in mountain, coastal, residential, and business areas were mostly 5-15 microgram/cu m, as determined by the p-p procedure. The maximum concentration of 30 microgram/cu m was measured at Chuo University.

12931 APTIC NO. 30635

Kanno, Saburo

MICROANALYSIS OF HEAVY METAL IONS IN THE ENVIRONMENT AND THE PROBLEMS AT ISSUE.

(Kankyochuno biryo jukinzoku no bunsekiho to mondaiten). Text in Japanese. Preprint, Society of Electrochemistry, Tokyo (Japan), 34p., 1970. (Presented at the Society of Electrochemistry Industrial Public Nuisance Control Seminar, Tokyo, Japan, Dec. 2-3, 1970, Paper 7.)

Representative methods for the microanalysis of mercury alkyl, total mercury, cadmium, lead, copper, zinc, and arsenic, and lead in the atmosphere and gasoline were discussed by describing the test procedures for each method. For the analysis of mercury alkyl, gas chromatography was described, while listing the test chemicals, apparatus, preparation of the test sample, and the test procedures. Procedures for the microanalysis of total mercury by an atomic absorption analysis method were described, including the test apparatus, test chemicals, prepartion of the samples, and the testing. The additional remarks included: How to prevent mercury from volatilizing during decomposition of the sample; quality of the absorption cell body, selection of desiccative, absorbency against quantity of stannous chloride solution added, effect of coexisting ions; calibration curve and reproducibility, plotting in chart, effect of temperature, recovery test of mercury, and arresting mercury from air. Atomic absorption analysis procedures for the microanalysis of cadmium, lead, copper, and zinc were also described. For the microanalysis of arsenic, procecures of the silver diethyl thiocarbamate method were described. Atomic absorption analysis procedures for analysis of lead in the atmosphere and gasoline were also given. Attached as enclosures were the Environmental Criteria Concerning Water Pollution and the Results of Analysis of the Tokyo Bay s Bottom Sludge.

12932 APTIC NO. 30840

Katz, Morris

ANALYSIS OF INORGANIC GASEOUS POLLUTANTS.

In: Air Pollution. Arthur C. Stern (ed.), Vol. 2, 2nd ed., New York, Academic Press, 1968, Chapt. 17, p. 53-114. 103 refs.

Inorganic gaseous pollutants represent an important class of substances in analysis of samples for air pollution control purposes and for the assessment of ambient air quality. Methods for the detection of short period average and maximum concentrations in the ambient air must be sensitive and accurate in the microchemical or ultramicrochemical range. Other desirable features of a method should include a high degree of specificity, ease of calibration, and minimum interference from other contaminant gases present in the air sample. Of the available methods for sulfur dioxide analysis, those commonly employed in ambient air sampling are conductimetric, titrimetric, colorimetric, turbidimetric, and iodimetric. Procedures for the analysis of sulfuric acid mists and hydrogen sulfide are also indicated. The most sensitive method for the determination of nitrogen dioxide in the atmosphere is based on the Griess-Ilosvay reaction in which a pink-colored dye complex is formed between sulfanilic acid, nitrate ion, and alpha-naphthylamine in an acid medium. A procedure for the determination of nitric oxide is also indicated. Two general methods have been recommended for the determination of oxidants and ozone: one is based on the use of a neutral, buffered potassium iodide solution as absorbent, while the second method involves the absorption of the sample in an alkaline solution of potassium iodide in which the interference due to sulfur dioxide is eliminated by treatment with hydrogen peroxide. In general, methods for the analysis of fluorides in air consist of sample collection, preparation of the sample by evaporation and by ashing to destroy organic matter, and steam distillation with perchloric acid to separate the fluoride from interfering substances, followed by colorimetric estimation by titration or by spectrophotometric procedure. Procedures are also described for the analyses of chlorine and hydrogen chloride, hydrogen cyanide and cyanides, ammonia and ammonium compounds, carbon monoxide, and carbon dioxide. Continuous analysis is discussed.

12933 APTIC NO. 30275

Kingston, D.

SELECTIVE MEDIA IN AIR SAMPLING: A REVIEW. *J. Appl. Bacteriol., 34(1):221-232, March 1971. 80 refs.*

Under field conditions, wanted microorganisms are often present in the air in small numbers and form a small portion of the total flora. Selective techinques would be useful, but may be difficult to devise, since airborne microorganisms are easily damaged. In a slit sampler, airborne organisms are impacted on the surface of an agar medium on which an air jet of approximately 130 mph is playing. However, this method of sampling, if carried out for a long period of time, often gives poor results. Selective media may be avoided by using indicator media, mechanical separation, or animal inoculation; the organisms may be transferred to selective conditions after some growth has taken place. Five selective agents to be used with the slit sampler are discussed, including specific nutrients, anaerobic incubation, temperature, antibiotics, and other added selective chemicals. A table of references for isolating individual organisms is also given. (Author summary modified)

12934 APTIC NO. 30683

Koessler, F. and I. Wolburg

METABOLISM OF MICROORGANISMS AS INDICATORS FOR TOXIC SUBSTANCES. *(Stoffwechselfunktionen von Mikroorganismen als Indikatoren fuer toxische Substanzen). Text in German. Z. Ges. Hyg., 17(5):317-321, May 1971. 16 refs.*

Microorganisms may react to the influences of toxic substances by changing their growth rate of their oxygen consumption, which under defined conditions can be quantitatively measured. Luminous bacteria change the intensity of emitted light which may be measured. The bioluminescence of Vibrio luminosus is a more sensitive indicator of toxic influences than growth rate or oxygen demand; it reacts immediately at very low concentrations. For some industrial toxicants, such as (xylene, toluene, benzene, nitrobenzene, and monochlorobenzene and insecticides, such as Demphion and Methylparathion, light emission decreases at concentrations between 2000 ppm (benzene) and 8 ppm (Methylparathion). Luminous bacteria are suitable for testing new substances as to their effect on biological reactions because of the sensitivity of the luciferin-luciferase reaction. For the tested industrial toxicants and insecticides, the sensitivity of the reaction does not suffice for use in an alert system, which indicates the maximum allowable working place concentrations.

12935 APTIC NO. 30407

Komechi, Tetsundo, Yu Fukushima, and Junji Kazuma

ON COMPARISON BETWEEN VALUE OF SULFUROUS ACID GAS DENSITY OBTAINED BY LEAD DIOXIDE METHOD AND THAT OBTAINED BY ELECTRIC CONDUCTIVITY METHOD. *(Nisankaenho to dodenritsuho ni yoru aryusangasu nodo sokuteichi no hikaku ni tsuite). Text in Japanese. Tokyo-to Kogai Kenkyusho (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), vol. 2:72-77, March 1971. 5 refs.*

Using data for sulfur dioxide obtained by the lead peroxide and electroconductivity methods at the same measuring stations from August 1969 to July 1970, a comparative study was made to examine the method by which to convert the value of SO2 obtained by the PbO2 method to that by the electric conductivity method. Two variations types of the PbO2 method were first compared with each other to determine reproducibility since the both were used in Tokyo. In one method, PbO2 is applied to a 100 sq m surface area of the sampler s cotton cloth; in the other it is applied to the entire surface area of the cloth and the area correction is made later. When converting the value obtained by the PbO2 method to the average monthly value of SO2 density, the value obtained by the electric conductivity method is taken as the standard value. The correlation coefficient between the two methods and the regression linear formula was calculated by measuring station, by month, and by season to cross-check the degree of correlation. The same results were obtained regardless of which of the two variations of the PbO2 method was used. Good results are indicated for all the measuring stations when the conversion formula is developed on a monthly basis from the regression linear formula. However, the regression linear formula developed on yearly basis for each measuring point and the regression linear formula as well as the correlation coefficient on a seasonal basis for all measuring sites do not yield good results. The data should include additional factors, such as humidity and wind velocity, to determine the correlativity between the two methods.

12936 APTIC NO. 30904

Koyama, H., T. Yatabe, S. Takagi, T. Tomizawa, and N. Aoki

DETERMINATION OF SULFUR OXIDES IN ATMOSPHERE (NO 3.). *(Taiki-chu io sankabutsu sokutei hoho (daisanpo)). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1): 41, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, Tokyo, Japan, 1970.)*

Efficiency tests were performed on an AP Meter and the rosaniline method of measuring sulfur dioxide in the atmosphere by the use of high accuracy standard gases. A gas producing device was constructed in order to enable production of highly accurate standard gases for a long period of time. The device is capable of creating the standard gases sulfur dioxide (0.02-2 ppm), nitric oxide, nitrogen dioxide, hydrogen chloride, chlorine (all 0.02 0.4 ppm), and carbon monoxide (2i40 ppm). Inaccuracies in the AP meter values were caused by fluctuation of gas quantity by temperature change; evaporation of absorbing agent; temperature change at electrodes; and adsorption by filters. Low temperature and humidity seemed especially pertinent to evaporation loss. The rosaniline method in general showed a 10% lower value. No influence on the SO2 value obtained by the AP meter occurred up to 0.2 ppm of NOx, 40 ppm of CO, and 0.2 ppm of HCl in the air. Weak SO2 in the air could be brought up to standard measurement by low temperature concentrations. On-location analyses revealed that the AP Meter values were higher in all cases than the rosaniline values. The chlorine value in the air showed no geographical difference (0.01 ppm). Nitrogen dioxide and gaseous hydrocarbons were discovered in the air, but showed no influence on the AP meter value of SO2. Ammonia in the air reduced the AP Meter value of SO2.

12937 APTIC NO. 30295

Kurosaka, Yoshinari

ADSORPTION OF SULFUR DIOXIDE ON SAMPLED DUST. *(Hoshu funjin eno aryusan gasu no Kyuchaku). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):56, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)*

In view of the toxicity of suspended particulates, the adsorption of sulfur dioxide on the particulates was investigated. Sulfur dioxide of constant concentration was passed through a filter holder containing suspended particulates that had been previously collected by a high-volume air sampler. After passage through the filter holder, the SO2 gas was collected by an impinger and analyzed by the p-rosaniline method. The adsorption rate of the dusts was defined as the ratio of the quantity of SO2 flowing out to the quantity of SO2 flowing in. The amount of adsorption increased with an increase in temperature at 25 C and at an SO2 concentration of 0.2 ppm. At a relative humidity of 20-40%, passing 300-400 l of gas at 1 l/min did not lead to adsorption. But when relative humidity was increased, the adsorption increased. When the dusts were combusted and the ashes tested, then adsorption ability was much higher.

12938 APTIC NO. 30279

Lapworth, K. C., L. A. Allnutt, and J. R. Pendlebury

TEMPERATURE MEASUREMENTS IN SHOCK-HEATED CARBON MONOXIDE BY AN INFRARED TECHNIQUE. *Brit. J. Appl. Phys., vol. 4:759-768, 1971. 9 refs.*

Temperatures in carbon monoxide behind the reflected shock wave in a shock tube were measured by an infrared emission-absorption technique with an accuracy about 1.5% to about two percent. These measurements covered the range 600 to 4000 K. There was good agreement between measured and calculated temperatures up to 1500 K. Above this temperature, the results were scattered and on the whole the measured results are a little higher than the calculated temperatures. The discrepancy and the scatter are attributed to interaction between the reflected shock wave and the boundary layer. Above 3500 K, measured temperatures fell well below the calculated temperatures due to rapid encroachment of cold driver gas into the shock-heated gas. (Author conclusions)

12939 APTIC NO. 30199

Larsson, Leif

PORTABLE APPARATUS FOR DETERMINING MERCURY IN AIR. *(Baebar apparat foer bestaemning av kvicksilver i luft). Text in Swedish. Svensk. Papperstid (Stockholm), 74(8):241-244, April 1971.*

A method for the determination of mercury in air with the aid of a light, portable device is described. The method is based on the absorption of mercury in an ampoule containing a carrier impregnated with potassium permanganate solution acidified with sulfuric acid. The absorption of the mercury is quantitative. In a subsequent step the mercury is extracted from the ampoule and can then be determined by a suitable wet chemical method. This method has been used for measurements in a chloralkali mill. (Author summary modified)

12940 APTIC NO. 30388

Lindgren, Per-Henning

A PORTABLE INSTRUMENT FOR MEASUREMENT OF ORGANIC SUBSTANCES IN AIR. *(Portabelt maetinstrument foer organiska aemnen i luft). Text in Swedish. Nord. Hyg. Tidskr. (Stockholm), 52(1));10-13, 1971. 2 refs.*

A portable instrument has been developed for direct measurements of the concentration of organic substances in air. It has a catalytically ignited hydrogen flame ionization detector, which is maintained at a slight vacuum with the aid of a small aspirator driven by carbon dioxide. The detector is kept at 100 C by a catalytic hydrogen heater. The air sample is drawn into the detector through a short and straight inlet tube which permits measurements of both organic gases and aerosol particles. Equipped for field use with a battery operated amplifier and recorder, the instrument is independent of external connections. Under field conditions the sensitivity is about one microgram/cu m, and in a permanent laboratory installation, with a net-driven amplifier and recorder, it is 0.005 mg/cu m. (Author abstract modified)

12941 APTIC NO. 30881

Lynn, R. L. and D. G. Crandall

SPECTRORADIOMETRIC DETECTION OF EFFLUENTS. *E. G. and G., Inc., Rept. PNE-954, 11p., Nov. 25, 1969. 2 refs.*

NTIS: PNE-954

A scanning interferometer spectrometer was used to measure the infrared spectral signature of the radioactive effluent from the cabriolet event. Measurements were conducted during the first three minutes after device detonation from a station six miles from ground zero. Several molecular species recognized in the effluent were ozone, carbon monoxide, and nitrogen dioxide. Other molecular species were tentatively identified, but positive identifications would require a laboratory study of the effects on the spectra of large concentrations of particulates suspended in the effluent. Background spectra from a region outside the effluent are also shown. While the sensitivity of the thermistor bolometer in the interferometer limited the data acquisition time to about three minutes after the detonation, cooled infrared detectors with sensitivities several orders of magnitude higher than those of the thermistor bolometer are available and should permit considerably longer measurement times with much higher signal-to-noise ratios.

12942 APTIC NO. 30264

Mascini, Marco

MEASUREMENT TECHNIQUES. *(Tecniche di misura). Text in Italian. Inquinaménto, 13(1):21-25, Jan.-Feb. 1971.*

One application of the use of ion-specific membrane electrodes is in testing the chemical composition of industrial effluents, liquid or gaseous, to detect and measure quantitatively the presence of dangerous levels of polluting substances. The device may be used either for direct measurements or for potentiometric titration, using ion-specific electrodes which are reversible for only one type of ion. For best results, another solution must be used as a standard that is as close as possible in its composition to that of the test solution.

12943 APTIC NO. 30793

Mascini, Marco

ION-SPECIFIC FILM ELECTRODES: A NEW ANALYTICAL METHOD FOR MEASURING WATER AND AIR POLLUTANTS. PART II: DATA OBTAINED FROM ANALYSIS WITH FILM ELECTRODES AND INDUSTRIAL EQUIPMENT. *(Elettrodi a membrana specifici per ioni: una nuova metadologia analitica per la misura degli inquinanti dell acqua e dell aria. 2. Risultati analitici con elettrodi a membrana e modelli industriali d impiego). Text in Italian. Inquinamento, 13(2):21-29, March 1971. Part I. Ibid., 13(1), Jan.-Feb. 1971.*

Ion-specific film electrodes are prepared by pulverizing insoluble salts containing the ion that is of interest to the researcher, and intimately mixing this powder with a thermoplastic polymer which is then pressed out to form a very compact film in a heat presser at a temperature of about 100-150 C and a pressure of about 200-300 atm. This film is then welded to a tube made of the same polymer as that contained in the film. Experimental data are given for tests with electrodes specific for halide, sulfide, silver, and cyanide ions. Practical application is made to the determination of hydrogen fluoride gas contained in the stack gases of an aluminum plant, using polarographic measurements.

12944 APTIC NO. 30817

Matsuoka, C., T. Kitamura, and I. Tahara

INFLUENCES OF HYDROGEN SULFIDE ON SULFUR DIOXIDE VALUES BY LEAD DIOXIDE METHOD. *(H_2S no sonzai ga PbO_2 ento-ho SO_2 ka ni ataeru eikyo). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):44, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, Tokyo, Japan, 1970.)*

The average sulfur trioxide content in 18 locations on the southern part of the eastern coastal industrial area of Tokushima Prefecture is 0.28 mg/day for 100 sq cm. In the northern part of the same area, the average for six locations is 0.90 mg, in spite of the amount of sulfur dioxide from heavy oil consumption in the south, which is seven times higher than that of the north. The tall stacks in the south might have influenced the diffusion pattern of SO_3, but the influence of hydrogen sulfide in the viscose rayon factory area in the north was suspected; an experiment was carried out. Glass filter paper was installed in a high-volume air sampler, and the exhaust end was connected to a polyvinyl chloride (P.V.C.) pipe 20 cm in diamter and 4 cm long. Compressed H_2S was sent into the pipe through a soap film flow meter at the rate of one to two milliliters per minute; the air with approximately one ppm H_2S was made. A lead dioxide cylinder was hung in this air for more than 24 hrs. The result from three PbO_2 cylinders with 1.5 ppm H_2S at 0.6 m/sec at 31 C and 67% humidity averaged 27 mg SO_3/day at 100 sq cm. It is concluded that H_2S has a significant influence on SO_2 values in the air.

12945 APTIC NO. 30336

McWilliam, I. G.

INSTRUMENTATION IN GAS ANALYSIS: GAS CHROMATOGRAPHY. *Aust. J. Instrum. Contr., 27(2):24-30, April 1971. 34 refs.*

Gas chromatography is one of the most important on-line analytical techniques. The basic principles of gas chromatography are described, followed by a more detailed discussion of sample introduction, columns, and detectors. The differences between laboratory and on-line chromatographs are outlined, and examples are given of on-line applications. Consideration is given to the use of computers in conjunction with gas chromatographs, and to the problems inherent in using an intermittent analytical technique for process control. Lists of published applications of on-line gas chromatography, and of manufacturers of on-line gas chromatogrpahs, are included. (Author summary modified)

12946 APTIC NO. 30755

Menzies, Robert T.

THE USE OF CO AND CO_2 LASERS TO DETECT POLLUTANTS IN THE ATMOSPHERE. *California Inst. of Tech., Pasadena Engineering and Applied Science Div., Grant AFOSR-68-1492, Proj. 9768-02, AFOSR 70-2921TR, 27p., Dec. 1970. 33 refs.*

NTIS, DDC: AD 717171

Several spectral coincidences between carbon monoxide laser emission lines and infrared absorption lines of oxides of nitrogen have recently been observed. Using existing infrared spectroscopy data, additional spectral coincidences are predicted. The Q-switched CO laser emits certain lines which overlap sulfur dioxide absorption lines, and certain frequency doubled carbon dioxide laser lines overlap nitric oxide and CO absorption lines. Based on such coincidences, remote sensing of these atmospheric constituents can be accomplished by observing resonant absorption, thermal emission, or fluorescence. Sensitivities are discussed for each of these methods, using data on line strengths and pressure broadened line widths. Wide band heterodyne receivers offer high sensitivity when they can be used. (Author abstract modified)

12947 APTIC NO. 30178

Mikami, Yukio and Tomogoro Shigeta

APPLICATION OF COMPUTER TO AUTO EXHAUST GAS ANALYSIS. *(Haiki gasu bunseki eno denshikeisanki no oyo). Text in Japanese. Bunseki Kiki (Analysis Instr.), 9(4):213-216, April 1971. 1 ref.*

A data processing system for the analysis of auto exhaust gas has been developed. A laboratory automation is an automation of laboratory experiments, observations, and examinations to promote the creativity of engineers and investigators; this is successful if adopted in a field in which the data are abundant and calculations are tedious. The realization of such an automation requires measuring instruments and apparatuses, controllers, and a data processing system. A number of experimental tests are needed, and considerable time and labor are involved if conventional measuring methods are adopted for auto exhaust. The development of this system consists of planning for personnel, education, programming, testing, and equipment. In this system everything is treated on line from the measurement of auto exhaust gas to the analytical results and the time for waiting is almost negligible. Moreover, the required operations are quite simple. An infrared analyzer was used to measure hydrocarbons, carbon monoxide and carbon dioxide in exhaust gas. The effects and the potentials of the system are also discussed.

12948 APTIC NO. 30789

Milhau, A.

DUST SAMPLING IN A GASEOUS VEIN. *(Prelevements de poussiere dans une veine gazeuse). Text in French. Tech. Moderne, 63(5):204-206, May 1971. 8 refs.*

Norms are in preparation containing recommendations for sampling dust carrying gases. They contain details of the equipment required which is composed of a conduit pipe or rectangular or round shape, held in a vertical position, into which is placed the sample taking tube. The latter is equipped with a removable tip which has the same inside diameter as the tube, but is tapered on the outside, ending in a knife edge at the end of the tip. This design results in the best possible condition for obtaining gas samples in which the dust concentration is as nearly as possible equal to that of the gas entering the conduit pipe. A connecting tube carries the sampled gas, which is being aspirated by means of a suction pump, to the outside of the conduit and through a dust trapping device in the form of a filter. It then passes through a gas meter and a flow control valve. Pressure gauges and thermometers are provided, to obtain readings which enable the operator to decide on adjustments to be made to ensure that desired test conditions are maintained throughout the test period.

12949 APTIC NO. 30697

Millan, Millan M., Stanley J. Townsend, and John Davies

STUDY OF THE BARRINGER REFRACTOR PLATE CORRELATION SPECTROMETER AS A REMOTE SENSING INSTRUMENT. *Toronto Univ. (Ontario), Inst. for Aerospace Studies, NASA Contract NAS-9492, APCO Contract PH22-68-44, UTIAS Rept. 146, 91p., Aug. 1970.*

NTIS: N71-11421

A theoretical study was made of the Barringer Refractor Plate Correlation Spectrometer, and several applications of the sensor were considered for the remote sensing of pollutant gases in the atmosphere. The instrument is intended to detect and measure the amount of a specified gas present between a suitable light source and the sensor. The technique employed is that of correlation spectroscopy which is based upon the measurement of the degree of similarity between the molecular absorption spectrum of a chosen gas and the actual total absorption spectra of all the gases seen by the instrument. The mechanical and electrical characteristics of the instrument are described, and an analysis is performed of the optical characteristics of the instrument. Interactions between the characteristics of the light source irradiating the gas, the transmission spectrum of the instrument, the transmission spectrum of the correlation mask, and the electronic circuitry are discussed. Application of the instrument to the remote sensing of pollutants in smokestack plumes and to the remote sensing of ground-covering atmospheric pollutants from a balloon-supported platform is discussed. (Author summary)

12950 APTIC NO. 30219

Miura, Michiaki

ANALYSIS OF STACK GAS. *(Endo gasu no bunseki). Text in Japanese. In: On Environmental Pollution Measuring Instruments and Analyzers, Kanto, Japan, Japan Society of Chemical Engineering, 1970, p. 18-23. 2 refs. (Presented at the Chemical Instruments Conference, 54th, July 28, 1970.)*

The continuous analysis of oxygen, sulfur dioxide, nitric oxide, and nitrogen dioxide in stack gases is discussed. The measurement of oxygen in stack gases is important for the combustion control of boilers. Low-oxygen combustion is viewed as an effective means to prevent corrosion by sulfuric acid, heat loss, and soot-blowing. This increases operational economy and prevents air pollution caused by dust dispersion. Diagrams were presented showing the relationships between excess air ratio and oxygen for various fuels, excess air ratio and sulfur trioxide, and sulfuric acid dew point and oxygen. According to the diagrams, SO_3 is not formed at an excess air ratio of zero, while the dew point becomes lower with a decrease of oxygen density. Nitrogen oxides increase with a higher excess air ratio. An oxygen meter suited for this use should have three full-scale ranges, zero to one percent, zero to five percent, and zero to ten percent, and have an accuracy amounting to plus two percent of the full scale, even at the one percent range. An oxygen meter best meeting these requirements is the magnetic-type oxygen meter. For the measurement of SO_2 in stack gases, an infrared ray analyzer is usually employed. The problem here is its selectivity, which is affected by about eight to ten percent water content present in the gas. The selectivity can be also affected by carbon dioxide and carbon monoxide in the gas. The use of the new positive/negative filter system has improved the selectivity, keeping the interference of 10% H_2O to 50 ppm or lower, and that of 14% CO_2 to 20 ppm or lower. High temperature and low-temperature methods are discussed for the sampling of stack gas for SO_2 analysis. Under the high-temperature method, the sampled gas is heated to avoid condensation of the water content and fed into the analyzer. This gives a high accuracy measurement of SO_2 but is subject to technical and practical problems in heating the sampler and the analyzer. The low-temperature method is simpler but lower in measuring accuracy since some of the SO_2 dissolves in water formed by condensation. The rapid cooling method developed by MSA of U.S.A. can keep the SO_2 loss to two percent or lower of the full scale. For measurement of nitrogen oxides, either infrared ray or ultraviolet ray analyzer is used. The problems of selectivity and sampling are the same as those discussed in SO_2 measurement.

12951 APTIC NO. 30659

Mohnen, Volker A.

IONOMETRIC COUNTERS. *Atmos. Environ., 5(3):137-145, March 1971. 22 refs.*

A differential ion chamber was developed for the continuous and nondestructive measurement of aerosol concentrations down to sizes of .000001 cm radius. Two ion chambers are connected together to a differential electrometer. The air in both chambers is ionized by a radium preparation. If dust-free air is present in both chambers, the ionization current is compensated; when air-containing dust is present in one chamber, the compensation is disturbed. Several instruments based on this principle are discussed, including a device to monitor thermally produced particulates, a dust counter, a device to record condensation nuclei, and a trace gas detector. Diagrams of each of these instruments are given. Environmental influences are eliminated by adding a reference chamber, identical to the measuring chamber, but kept free of aerosols and by operating these chambers in a differential mode. The basic theoretical relationship between the ion current measured and the aerosol concentration to be determined is also discussed.

12952 APTIC NO. 30166

DEVELOPMENT AND APPLICATION OF LIGHT SCANNING RAPID MEASUREMENT APPARATUS FOR PARTICLE SIZE DISTRIBUTION. *Text in Japanese. Funtai Oyobi Funmatsuyakin Powder Powder Met., 17(7):285-294, April 1971. 12 refs.*

A suspension of particles was scanned by a narrow beam of light parallel to the suspension surface from the surface to the bottom of the cell in .04 sec. A tungsten lamp was employed as the light source. The light through the cell was then received by a photocell. The particle size distribution was depicted on the Brown tube of an oscilloscope. Particle size calculation from the curve obtained is explained, together with its application to various samples, including white alunite fine dust, loam, and titanium oxide. Several problems accompanying the use of the device are also shown.

12953 APTIC NO. 30811

Nakagawa, B, S. Kuwata, H. Sugiyama, and K. Obata

DATA OF ODOR MEASUREMENT BY SHUKEN KINOSHITA APPARATUS. *(Shuken Kinoshita shiki shuki sokutei sochi ni yoru shukido no sokutei). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):96, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, Tokyo, Japan, 1970.)*

The Shuken Kinoshita odor measuring apparatus is most sensitive to the following single elements: ammonia, amines, hydrogen sulfide, ammonium sulfide, aldehydes, and alcohols. It is less sensitive to mercaptans, dimethylsulfide, and other insoluble odors. It is insensitive to low molecule fatty acids. The odors that were detected most effectively in actual applications near odor producing factories cam from fish meal (intestines and bones), chicken excretion, soluble adsorption feed stuff, exhausts from vacuum cars (?), vitamin oil, and leftover processing (for pig feed). Less detectable odors were from animal bone processing, feather processing, marine products paste, leather, fertilizer manufacturing, and craft pulp. The instrument was insensitive to the incinerators of animal corpses and to relatively weak odors such as environmental odor. Those odors that could not be tested because of the lack of material were glue, oil fertilizer, plastic, oil refinery, petroleum chemicals, and rubber processing.

12954 APTIC NO. 30610

Norton, Thomas W.

COMPARATIVE MEASUREMENTS WITH THE ASRC AEROSOL DETECTOR. *Atmos. Environ., 5(4):217-223, April 1971. 8 refs.*

Experimental measurements of aerosols using the ionometric counter were conducted to evaluate the relative performance of this instrument with that of two commercially available aerosol detectors. A gasoline engine, a source of particles with a wide size spectrum, as might occur naturally, was used in the tests. The aerosol concentrations were continuously monitored by three instruments: a condensation nuclei counter (CNC), an optical dust counter, and the ASRC aerosol detector. The CNC and ASRC counters are integrating instruments, both of which showed a linear response to the aerosols encountered in the tests. The CNC had a high sensitivity, responding to particles smaller in size and lower in concentration. The ionometric counter showed good stability and a response to sizes between that of the CNC and the optical counters. It is also provided an easy method to obtain information about the aerosol size distribution when used with another instrument that measures the particle concentration. It is suitable for the continuous monitoring of natural aerosols or other polydisperse aerosols containing particles larger than .000001 cm. While the CNC performs well in most cases and is suitable for clean air field conditions, the ionometric counter has the advantage of pneumatic integration of high-level air pollution measurements in cities. (Author abstract modified)

12955 APTIC NO. 30813

Okita, T. and H. Kirihara

SEPARATION AND QUANTITATIVE ANALYSES OF HYDROGEN CHLORIDE AND CHLORIDE PARTICLES IN THE ATMOSPHERE. *(Taikichu enka suiso oyobi ryushijo enkabutsu no bunri teiryoho). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):71, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, Tokyo, Japan 1970.)*

Hydrogen chloride in the air was captured by a filter of Oriental paper 51A which was soaked in a 10% solution of sodium carbonate and dried, or by a German A glass fiber filter which was soaked in 5% solution of caustic soda and dried. Both types of filters obtained close to 100% results. The filters for chloride particles were selected for their ability to filter through HCl as close to 100% as possible and also for the low Cl content in the filters themselves. A LSWP filter obtained the best result (Cl content of filter, zero; filtering of HCl 90%). Polypropylene filters showed the second best results (Cl content, zero; filtering of HCl, 68 to 99%). Adsorption of HCl on the filter was prevented by winding a ribbon heater of 250W around the filter holders and applying 30V (approximately 30W). The best result was obtained by using a LSWP or polypropylene filter first, and heating the filter when humidity was high. A second filtering was done through a filter smeared with sodium carbonate or caustic soda. The air flow was 15 l/min. A soxhlet extractor was used for extracting chlorine from the filter; a mercury thiocyanate method was used for analysis. In application, on May 25 in Utsunomiya City; Cl particles were 11.2 micrograms/cu m and Cl gas, 13.2 micrograms/cu m (8.4 ppb); on June 8-9 in Niigata, Cl particles were 3.0-3.8 micrograms/cu m and Cl gas, 0.0/cu m; on June 11 in Yuzawa, Cl particles were 2.3 micrograms/cu m and Cl gas, 0.0/cu m.

12956 APTIC NO. 30417

OMara, Michael M.

PYROLYSIS-GAS CHROMATOGRAPHIC ANALYSIS OF POLY(VINYL CHLORIDE). II. IN SITU ABSORPTION OF HCL DURING PYROLYSIS AND COMBUSTION OF PVC. *J. Polymer Sci., 9(5):1387-1400, May 1971. 13 refs.*

A pyrolysis-gas chromatographic technique for measuring the amount of hydrogen chloride released during the high temperature pyrolysis of polyvinyl chloride resins, plastisols, copylmers, and compounds containing inert fillers was developed. The technique, which is also applicable to the analysis of chlorinated polyethylene and chlorinated polyvinyl chloride, is based on the use of a standard precursor of hydrogen chloride, polyvinyl chloride homopolymer. The analysis was successfully used to measure the degree of in situ absorption of HCl during pyrolysis by certain basic fillters (potassium carbonate, calcium carbonate, calcium oxide, magnesium oxide, aluminum hydroxide, sodium carbonate, aluminum oxide, and lithium hydroxide, sodium carbonate, aluminum oxide, and lithium hydroxide) dispersed in a polyvinyl chloride-o-ciocyl phthalate matrix. Combustion of a number of combustion residues (chloride determination) revealed that the amount of

HCl absorbed by the basic filler was independent of the method of degradation (pyrolysis or combustion). Flammability measurements of those matrices having the same composition indicate that in situ absorption of HCl during combustion has little effect on the overall flammability of these materials. (Author summary)

12957 APTIC NO. 30222

Osburn, Robert L., A. D. Shendrikar, and Philip W. West

NEW SPECTROPHOTOMETRIC METHOD FOR DETERMINATION OF SUBMICROGRAM QUANTITIES OF SELENIUM. *Anal. Chem., 43(4):594-597, April 1971. 13 refs.*

A new spectrophotometric method for the determination of submicrogram quantities of selenous acid has been developed. The procedure is basedupon the oxidation of hydroxylamine hydrochloride to nitrous acid by selenous acid followed by the diazotization of sulfanilamide by the nitrite produced and subsequent coupling of the diazonium salt with N(1-naphthyl)-ethylenediamine dihydrochloride. Reaction parameters such as temperature, time, and reagent concentrations have been studied in detail and optimum conditions for the system have been established. The range of determination extends from 0.01 to 0.20 milligrams of selenium(IV) per liter. The method is simple, sensitive, and reproducible. There are no common interferences which cannot be easily obviated. Data for the selenium content of smoke samples is also given. (Author summary modified)

12958 APTIC NO. 30231

Paez, Dora M. and Omar A. Guagnini

ISOLATION AND ULTRAMICRO DETERMINATION OF HYDROGEN SULPHIDE IN AIR OR WATER BY USE OF ION-EXCHANGE RESIN. *Mikrochim. Acta (Vienna), no. 220-224, 1971. 15 refs.*

The method described for the ultramicro determination of hydrogen sulfide in gaseous mixtures or water is based on the sorption of hydrogen sulfide on columns of Amberlite IRA 400, followed by elution with 4 M sodium hydroxide and colorimetric estimation. The eluate is collected in a glass-stoppered tube and placed in an ice-bath to which 10 ml of 4N sulfuric acid, 0.6 ml of amino test solution, and 0.02 ml of ferric chloride solution are slowly added. After five minutes of shaking, the mixture is left to rest for 30 min. Absorbance at 670 nm is then determined. The method permits the rapid determination of 1-20 micrograms of hydrogen sulfide present at dilutions of 0.07-20 ppm in the air. The resin retains the sulfide for about 10 days without loss.

12959 APTIC NO. 30824

Perry, R., R. Long, and J. R. Majer

THE USE OF MASS SPECTROMETRY IN THE ANALYSIS OF AIR POLLUTANTS. *Preprint, International Union of Air Pollution Prevention Associations, 21p., 1970. 12 refs. (Presented at the International Clean Air Congress, 2nd, Washington, D. C., Dec. 6-11, 1970, Paper CP-37E.)*

Of the analytical techniques available for the estimation of polycyclic hydrocarbons, high resolution mass spectrometry is now undoubtedly the most sensitive. While its use has been somewhat limited because of the wide range in volatility of the polycyclic aromatics, and integrated ion-current technique has recently been employed to determine picogram quantities of these compounds introduced into the ion source by means of a direct insertion probe. The versatility and sensitivity of the integrated ion-current technique is demonstrated by comparing the analysis of a soot extract obtained by mass spectrometry with that obtained by gas chromatography. The use of gas chromatography for estimating the polycyclic compounds present in a soot has the advantage that a simultaneous analysis can be carried out for many of the more volatile compounds present. However, this technique has the disadvantage of being comparatively insensitive.

12960 APTIC NO. 30740

Pueschel, Rudolf Franz

PRINCIPLES AND APPLICATIONS OF THE FLAME SCINTILLATION SPECTRAL ANALYSIS. *Washington Univ., Seattle, Dept. of Civil Engineering, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., 1969, 168p. 44 refs.*

A complete theoretical and experimental analysis is presented of the classical flame scintillation method for analysis of aerosol particles. This method involves the evaporation of particulate matter and excitation of atoms in a hydrogen-oxygen flame so that the light characteristic of the metallic composition of the particles is emitted. Information regarding composition and size distribution of the particles can be obtained. In contradiction to several published papers in the field, it is predicted that the intensity of light from one particle is proportional to the area of the particle, depending on substance and size. Further, differences in emitted intensity between compounds of a particular cation (e.g., sodium) are predicted to exist. The prediction of both the area and composition dependences was confirmed experimentally. This method also provides chemical and size information. It is the chemical nature of particles that determines (among many properties) hygroscopicity. Therefore, the method promises to be applicable in a wide range of atmospheric chemistry and cloud physics studies. (Author abstract modified)

12961 APTIC NO. 30370

Rathgeber, Ferdinand

MAINTENANCE OF CLEAN AIR AT THE OPERATION OF VEHICLES AND COMBUSTION ENGINES. *(Luftreinhaltung beim Betrieb von Kraftfahrzeugen und Verbrennungsmotoren). Text in German. Wasser Luft Betrieb, 15(6):207-210, June 1971.*

Measuring instruments for the control of automobile exhaust gases are described. These units operate on various principles. With the heat conductance method, the waste gases are contacted with an electrically heated platinum spiral which is cooled to a greater or lesser extent, depending on the heat conductance of the waste gases. All unburned combustible waste gas components are catalytically afterburned. The necessary oxygen is supplied by the addition of a defined quantity of air. Through catalytic combustion, the temperature and electric resistance of the red glowing platinum spiral is changed, the extent of which is indicated on the instrument. With the infrared method, a ceramic heater radiates infrared light in all directions. A reflector deflects the radiation from the rear of the heater toward the instrument. Infrared light of a certain wavelength is absorbed by carbon monoxide but not by other exhaust gas components. Several units based on the infrared principle are available. Draeger tubes can also be used for exhaust gas testing. They are glass tubes containing a chemical substance which is carefully prepared to suit special measurement purposes.

12962 APTIC NO. 30277

Sall, A. O.

OPTICAL FILTERS FOR THE INFRARED ANALYSIS OF CARBON MONOXIDE, CARBON DIOXIDE, AND METHANE BLENDS. *Ind. Lab. (USSR) (English translation from Russian of: Zavodsk. Lab.), 36(12):1965-1966, Dec. 1970. 1 ref.*

A list is given of optical filter materials and thicknesses for insertion in radiation beams used in the infrared analysis of carbon monoxide, carbon dioxide, and methane in mixtures. The filters can be employed in monoschemes where only the working bean is passed through the mixture or in bischemes where both working and reference beams pass through the mixture. The bischeme increases the selectivity of the monoscheme by more than one order of magnitude when the same filters are used. The recorded signal, which is proportional to the difference between the beams compared, depends on the concentration of the component to be determined and is practically independent of variations in the concentration of interfering components.

12963 APTIC NO. 30232

Schaffernicht, H.

PORTABLE GAS SAMPLING UNIT WITH BATTERY FOR SUMMARY DETERMINATION OF ANY POLLUTANT DURING A NORMAL WORKING PERIOD. *(Tragbares, netzunabhaengiges Gasprobenahmegeraert zur summarischen Erfassung beliebiger Schadstoffe waehrend einer normalen Arbeitsschicht). Text in German. Z. Ges. Hyg. (Berlin), 17(3):175-177, 1971. 4 refs.*

The battery-powered gas sampler described has a membrane pump with a suction capacity of 40-100 l/hr. The battery s capacity is adequate for 8-10 hr of continuous operation. For absorption, benzene absorption pipes packed with fine glass balls or cotton are used. The entire unit weighs 1.5 kg. The device was tested in a plant manufacturing concrete panels. Before the concrete is cast, the molds are sprayed with oil for one minute. Using the unit described, samples were taken for 77 min (10 sprayings); the cotton used to pack the absorption tube was then extracted with acetone. After evaporation of the solvent the oil residues were weighed. In 30 l of air, 3.45 mg oil were determined, corresponding to 115 mg oil/cu m during exposure time. This concentration far exceeds the maximum allowable concentration for oil mists (20 mg/cu m).

12964 APTIC NO. 30704

Shoji, Hikaru, Takeo Yamamoto, Konosuke Nishida, Yasuo Yagi, and Susumu Takada

THE GAS CHROMATOGRAPHIC ANALYSIS OF THE DIGESTION GASES AND THE OFFENSIVE COMPOUNDS PRODUCED IN THE PROCESS OF NIGHT SOIL TREATMENT. *Text in Japanese. Nippon Eiseigaku Zasshi (Japan J. Hyg.), 22(2):32-47, June 1967. 39 refs.*

Offensive components in the night soil treatment plants where anaerobic digestion was used were analyzed by gas chromatography. The gases in the digestion tanks contained 20.6 to 27.4% carbon dioxide, 51.7 to 66.0% methane, and 0.9 to 2.0% oxygen. The gases in the tightly sealed trickling filter contained 15.0% CO2, 30.4% CH4, and 20.4% 02. The determination of aliphatic amines, ammonia, and hydrogen sulfide was carried out using a Triton X-100 and Quadol column after the samples were collected into distilled water. In the digestion tanks, there was 40.2 to 61.0 ppm total amines, 440 to 1220 ppm ammonia, and 3180 to 8068 ppm hydrogen sulfide. Aliphatic aldehydes, ethanol, aliphatic mercaptans, thioether, indol, and skatol were also determined using appropriate columns. It was suggested that mercaptans and skatol in the digestion tanks exert large effects on human olfaction. (Author abstract modified)

12965 APTIC NO. 30233

Simpson, C. C.

CONTINUOUS ANALYSIS OF GASEOUS POLLUTANTS. PART 1. *Australian Chem. Proc. Eng., 24(4):24-32, April 1971. 2 refs.*

Techniques for continuous gas analysis in air pollution control programs are reviewed. Batch techniques and systems are compared to systems of the on-line variety. Continuous gas analyzers fall into two main classes: the first class measures intensive properties of the gas, while the second class of analyzer measures extensive properties, usually consisting of a quantitative chemical process followed by detection of some physical principle. Physical methods fall into the first category. As such they are not proportionally flow-sensitive but most are pressure-sensitive as they basically measure the mass of the gas of interest in a fixed volume. The temperature aspect is, of course, overcome by thermostating. The vast majority of the second class of analyzer are both proportionally pressure-sensitive and proportionally flow-sensitive, as they essentially measure flow rate multiplied by concentration. Calibration and outputs are indicated, as well as the combination of sampling and analysis systems. Analytical applications to air pollution studies might include vehicle exhaust measurement.

12966 APTIC NO. 30280

Sutton, R. A.

WHAT S NEW IN METERING AND MEASUREMENT. *Pipe Line Ind., 34(6):27-31, June 1971. (Presented at the AGA Distribution Conference, Chicago, Ill., May 10-13, 1971.)*

During the past decade, utilities and manufacturers have concentrated more resources, technical knowledge, and capital expenditures than ever before to advance the technology of new metering and monitoring techniques. Among meters that have been investigated or evaluated by the gas industry are the following: laser beam meter, thermoelectric flow transducer, sonic gas measuring system, ionization meter, nuclear magnetic resonance flowmeter, swirlmeter, vortex shedding flowmeter, and turbine meters. The principle of operation of each instrument is summarized and/or schematically illustrated.

12967 APTIC NO. 30906

Tajiri, T., T. Shirasawa, I. Tamori, and K. Harada

SIGRIST DUST MONITORING APPARATUS FOR CONTINUOUS OPERATION AND THE PERFORMANCE. *(Sigrist fuyu funjin nodo jido kiroku sochi to sono seino ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):54, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, Tokyo, Japan, 1970.)*

Comparative performance tests were carried out on the Swiss Sigrist dust monitoring device and Japanese particulate measuring devices such as the tape sampler, individual sampler, thermal precipitator, impinger, and tyndallometer. The Sigrist Staub-Rauchdiche-Messgerates (S.R.M.O) utilizes measurements of light scattering and a purely optical null method. It is capable of continuous operation, high sensitivity, applicability to almost any capacity by changing the standard cell, and the omission of zero adjustment. The result of simultaneous dust monitoring revealed that the S.R.M. is suitable for measuring environmental particulates.

12968 APTIC NO. 30786

Tanaka, K., K. Fukaya, K. Yoshitani, S. Kanno, and S. Fukui

DETERMINATION OF LEAD IN GASOLINE BY ATOMIC ABSORPTION PHOTOMETRIC. *Text in Japanese. Kogai To Taisaku (J. Pollution Control), 5(1):66, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)*

Tetramethyl and tetraethyl lead were diluted with methylisobutyl ketone (MIBK), respectively, and measured by atomic absorption photometry. The values obtained were identical with that of vegadex (DDTC) chelate in MIBK prepared from Pb(NO3)2. To prepare the lead standard solution, Pb(NO3)2, in 10% HNO3, was chelated with DDTC at PH-7 followed by extraction with MIBK (absorption As). Gasoline was diluted to approximately two % with MIBK and tested (absorption A) (multiple D) Ao2 and Ao1 for absorptions of MIBK and 10% HNO3 respectively. Methods of calculating the lead concentrations are presented and experimental results summarized in tabular and graphic form.

12969 APTIC NO. 30634

Tanaka, Masao

ON MEASURING INSTRUMENTS FOR SULFUROUS ACID GAS IN EXHAUST SMOKE. *(Haien chu no aryusangasu sokutei kiki ni tsuite). Text in Japanese. Nenryo oyobi nensyo (Fuel and Combustion), no. (2):25-31, Feb. 1971.*

The basic mechanism of a non-dispersion infrared-type (NDIR) gas analyzer and the gas sampling system for the analyzer are introduced. Any gas composed of different elements such as carbon monoxide, sulfur dioxide, ammonia, water, methane, ethane, ethylene, acetylene, or benzene, shows its own specific pattern of infrared ray absorption in the range of 2-15 micron. When a particular gas flows into the beams of infrared rays, the intensity of infrared rays of specific wavelength, having passed through the gas, changes according to the density of the gas. The intensity of a specific infrared ray is then detected by an infrared ray detector for the measurement of the gas density. A positive-type NDIR analyzer was used as an example to further describe the basic construction and mechanism of the NDIR analyzer. The infrared ray beams from the light sources are interrupted intermittently at an interval of 2-15 Hz by a rotary shutter, and go through the measuring tank and comparison tank to reach the detector. Nitrogen, or a similar gas, that does not absorb the infrared ray is sealed in the comparison tank, while the gas constitutent to be measured is sealed in the detector equipped with a membrane condenser inside. The membrane partitions the interior of the detector into two and intermits the lights from the measuring tank and comparison tank simultaneously. The energy difference between the two lights is thus detected, since the light coming through the measuring tank has become weak according to density of the gas. When sampling gas for the analyzer, the gas should be pretreated before being fed into the analyzer. The sampling process usually consists of sampling, removal of dust, separation of condensate, removal of interference substances, and pumping. Although some of the SO2 is dissolved in the condensate water during the gas sampling, the amount lost is theoretically negligible.

12970 APTIC NO. 30905

Tani, M., Y. Hashimoto, and R. Hayakawa

SPECTROGRAPHIC ANALYSIS OF METALS IN AIR BORNE PARTICULATES BY POWDER METHOD. *(Funmatsuho ni yoru taiki baijin-chu no kinzoku seibun bunseki). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):57, 1970. (Proceedings of the Japan Society of Air POllution, Annual Meeting, 11th, Tokyo, Japan, 1970.)*

The National Air Sampling Network (NASN) method is presently utilized for the metal component analysis of polluted air. However, this method does not permit measuring metals of relatively low concentrations in the air (e.g., cobalt, chromium, and beryllium), even a small amount of which can be toxic. A method of measuring such low concentration metals in the air was devised and satisfactory results were obtained. The treatment of the test material followed the same procedure as the NASN method up to the extraction of SSG (1:1) HNO3. The lutecium and indium were added. The material was evaporated and solidified and a buffer solution(NaCl 1: graphite 5) was mixed by a Mixer Mill. The substance was poured into a crater type electrode and light was emitted. The device enable measuring low value metal content in the air, and also broadened the scope of measurements for previously measured elements.

12971 APTIC NO. 30733

Terraglio, Frank Peter

LABORATORY EVALUATION OF METHODS FOR SULFUR DIOXIDE IN AIR. *Rutgers, The State Univ., New Brunswick, N. J., Thesis (M.S.), March 1962, 107p. 94 refs.*

Three wet chemical methods (colorimetric, iodimetric, and acidimetric) for analyzing atmospheric sulfur dioxide were studied. Test atmospheres were produced in a 200-cu ft chamber. Fritted glass bubblers and impingers were subjected to a number of tests to determine collection efficiency for atmospheric SO2. The fritted glass bubblers were found to be more efficient sampling units if connected in a series of two samplers with an air flow below 5 cu decimeters/min. Analytical procedures used in the colorimetric method gave the most precise results of the three, provided that at least 0.08 mg of sulfite is collected, and results obtained by the colorimetric method on ambient samples have greater precision than either the acidimetric or iodimetric methods. Average recoveries by the acidimetric method are equivalent to those obtained by the colorimetric method but values obtained by the iodimetric method are below those obtained by either of the other two methods. The presence of ozone and oxides of nitrogen decreases the apparent recovery by the colorimetric and iodimetric methods and increases the apparent concentration obtained by the acidimetric method. Therefore, where high concentrations of ozone and oxides of nitrogen exist, none of the three methods tested give reliable results. (Author summary modified)

12972 APTIC NO. 30711

Thoenes, Hans Willi

REPORT ON LECTURE GROUP D; OF THE CONGRESS REINHALTUNG DER LUFT 1969. *Staub (English translation from German of: Staub, Reinhaltung Luft), 30(2):18-23, Feb. 1970. 7 refs.*

NTIS: TT 70-50047/2

A survey is presented of lectures dealing with measurements of air pollutants. Measurements of dust emissions are discussed with reference to improved instruments based on the light extinction principle and to devices measuring the intensity of light scattered by particles (photoelectric smoke-density measurers). Optical and gravimetric methods for measuring particle concentrations are compared. Accurate measurements of air pollution by gases are obtained with a galvanic detector with silver electrodes and a solid organic electrolyte. The reaction of the measured components in this self-contained current-generating detector causes electrons to traverse the external conductor of the galvanic element, which insures high measuring sensitivity. Emissions at different sites can be determined according to a method comprising continuous and discontinuous measurements and based on random sampling theory. Then it is impossible to determine all pollutants separately, variance analysis and correlation calculations permit selection of the most representative substances. Also discussed are the use of plant indicators of pollution and a new electroconductivity analyzer for continuous sulfur trioxide measurements.

12973 APTIC NO. 30694

Tommerdahl, J. B., R. B. Strong, and A. H. Truckner

CHEMILUMINESCENT OZONE METER FOR CONTINUOUS AIR MONITORING PROJECT. (FINAL REPORT AND INSTRUCTION MANUAL). *Research Triangle Inst., Research Triangle Park, N. C., Engineering and Environmental Sciences Div., APCO Contract CPA 70-27, 80p., Jan. 1971. 2 refs.*
NTIS: PB 198065

A chemiluminescent ozone meter intended, ultimately, for Continuous Air Monitoring Program stations is discussed with reference to its functional and operational characteristics and the design of its various sub-assemblies. Various details concerning parts lists, installation and maintenance of the instrument, calibration procedures, and operational procedures are included in the respective appendices. The principle on which the ozone meter operates is as follows: When ozone reacts with certain inorganic compounds, a minute amount of light is emitted. The amount of light is directly proportional to the ozone concentration, and the wavelength of the emitted light is a function of the organic compound or dye used in the formation of the chemiluminescent disc. Gases to be sampled are passed over a disc coated with the dye. The emitted light resulting from the reaction with ozone is detected by a sensitive photodetector.

12974 APTIC NO. 30593

Tonkelaar, W. A. M. den and Martha A. Bikker

MICRODETERMINATION OF LEAD ON TAPES OF AN A.I.S.I. AUTOMATIC AIR SAMPLER BY ATOMIC ABSORPTION SPECTROSCOPY. *Atmos. Environ., 5(5):353-356, May 1971. 11 refs.*

A sensitive, fast, routine procedure is described for the determination of lead in air borne particulate samples collected on tapes of an AISI automatic air sampler using atomic absorption spectroscopy. After punching the spot out of the aper tape and adding a small volume of dilute nitric acid, the absorbance can be read after 30 min by spraying the extract into the flame. A detection limit of less than 0.1 micrograms lead/spot has been reached. The lead content of a blank filter is negligible and the calibration curve is scarcely affected by matrix effects. In this manner, over 800 two-hour samples, collected near a highway over a two year period, were analyzed, yielding results of less than 0.1-9.1 micrograms lead/cu m of air. The pattern of the diurnal particulate lead concentration reflected the morning and afternoon rush hour traffic. (Author abstract modified)

12975 APTIC NO. 30366

Tsujikawa, Teruyuki, Yoshikazu Takatuka, and Katsumi Yoshida

ESTIMATION OF SULFURIC ACID MIST IN THE AIR. *(Taikichu ryusanmisuto sokuteiho no kento). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan J. Public Health), 18(5):363-369, May 1971. 25 refs.*

To examine the methods of measuring sulfuric acid mist in the air, the collection rates of different filter papers were studied. A comparison was made between borax titration and the micronized method of titration with sodium hydroxide neutralization of JIS. Using these methods, H2SO4 in the air of Yokkaichi City was measured. On the basis of Whatman No. 4 filter paper, which has mist collecting rate of 96-99%, the collecting rates of seven different kinds of filter papers were compared by using direct titrimetry of NaOH neutralization. The results indicated that a sheet of Toyo filter paper 5A (cellulose filter) was the best collector of H2SO4 mist. The results of reverse titrimetry of NaOH neutralization showed almost the same measurement value as that of borax reverse titrimetry; the metachromatism by the indicator was clearer than the indicator of borax reverse titrimetry. The test filter papers should be titrated immediately after aeration, but there seems to be no effect to the measurement value if it is calculated within 24 hours after the test. The sulfur dioxide that was absorbed on the filter paper had little effect on the measurement value of H2SO4. The measurement value of H2SO4 mist, which is not compensated with ammonia in Yokkaichi City, was O 110 mg/cu m. This indicated some correlation with the sulfur dioxide concentration in the air. Since ammonia acts upon H2SO4 mist forming ammonia sulfate, when measuring the amount of H2SO4 mist by means of titrimetry of NaOH neutralization, the total amount of both H2SO4 mist and ammonia sulfate should be the total amount of H2SO4 mist.

12976 APTIC NO. 30306

Watanabe, Hiroshi, Takashi Nakadoi, and Yusuke Hirata

ON THE CHANGE IN COMPONENTS OF HYDROCARBONS AND THEIR PHOTOCHEMICAL ACTIVITIES. *(Toshi taikichu tankasuisorui sosei no dotai to kokagakuteki kyodo ni tsuite). Text in Japanese. In: Studies on Effects of Automobile Exhaust Gases on Man. (Jidosha haikigasu no jintai ni oyobosueikyo ni kansuru kenkyu). Chapt. B, p. 85-119, March 1969.*

To analyze hydrocarbon contents in air, an automatic concentrating sampler was developed. An auto-depressor, which controlled air pressure within the range from 50 mm Hg to 380 mm Hg, was attached to prevent a flow rate decrease in the sampled air. The sampler was designed so that the sample air was heated and evaporated by 200 w nichrome wire during its passage through a U-shape pipe for concentration. The sampler was also designed so that the concentrated air could be introduced to a gas chromatographic device connected to this pipe. In case the air pressure in the U-shape pipe was not controlled, oxygen and carbon dioxide in air were condensed and caused a decrease of air flow rate after five minutes. However, such a decrease was prevented by the newly developed device, and it was found to be suitable for continuous sampling. Activated alumina, sellaite, 10% SE-30, and glass beads were compared for their suitability as filters for the U-shaped pipe. Activated alumina was not suitable for normal gas chromatography because oxygen and carbon dioxide condensed in the sample air; the other filters showed good results. Glass beads were especially fitted for sampling lower hydrocarbons (C2 C5), except methane, and were found to be most adequate for a long-term use due to their low quality change. Separation of ethane-ethylene by DMS and ODPN-DMS, which were ordinarily used as columns in gas chromatography, was impossible; satisfactory results were obtained for their separation by use of 2% squalane-activated alumina.

12977 APTIC NO. 30258

Yanagihara, Shigeru, Eiichi Shinoyama, and Osamu Noda

DATA PROCESSING OF EXHAUST GAS TESTS BY A SMALL COMPUTER. *(Kogata densanki niyoru haiki gasu shiken data shori nitsuite). Text in Japanese. Kenkyu Happyo Gaiyo (Abstr. Published Res.), p. 8-9, April 15, 1971.*

In the seven-mode or four-mode test, the exhaust is continuously analyzed while an automobile is operated on a chassis dynamometer. Processing of the data read from the gas analyzer recorder is extremely time consuming: in the seven-mode test, one test is completed in 16 min but its data processing takes over four hrs. A computer system was developed to process data on nitric oxide and nitrogen dioxide concentrations of the seven-mode test. Data from four engines were simultaneously handled. Another system developed gives the average of data from two sources. With the data processing system, the effect of idling on carbon monoxide concentration can be determined from data of seven-mode or four-mode tests.

12978 APTIC NO. 30372

Yatabe, Teruo and Toshi Tomizawa

INVESTIGATION ON THE PRECISION OF MEASUREMENT FOR NITROGEN OXIDES IN FLUE GASES. *(Chisso sankabutsu sokutei seido no kento). Text in Japanese. Denryoku Chuo Kenkyusho Gijutsu Kenkyusho Hokoku (Tech. Lab. Central Res. Inst. Electric Power Ind. Rept.), no. 70053:1-16, Jan. 1971.*

Nitrogen oxides, which are emitted from automobiles, chemical plants, and stationary fuel combustion equipment are considered one of the causes of photochemical smog formation. A method for measuring nitrogen oxides must be established before concentrations can be determined or control techniques investigated. One method for determining the nitrogen oxides in flue gases is the naphthyl ethylenediamine method. The deviation and precision of nitrogen oxides determination were investigated using nitric oxide standard gas and flue gas from pilot combustion equipment. The nitrogen oxides concentration values were 20-30% lower than the calculated values in the oxidation of NO to NO2 with air in two hours. No difference appeared between the two values when NO was oxidized to NO2 with oxygen in two hours. The nitrogen oxides concentration values were about 90% of the calculated values when determined in the presence of three to five times of sulfur dioxide against the nitrogen oxides in the flue gas. The difference was reduced by passing the flue gas through a hydrogen peroxide absorbing solution, thereby scrubbing the SO2. The standard deviation of nitrogen oxides determinations decreased .4 by consolidating the measurement procedures. The repeatability and reproducibility of the measurements were 12 ppm and 16 ppm, respectively, when the nitrogen oxides concentration was 160 ppm in the flue gas.

12979 APTIC NO. 30785

Yatsumaki, Maoomi

ANALYSIS OF NITROGEN OXIDES IN AUTO EXHAUST GAS. *(Jidosha haiki gasuchu no chisso sankabutsu bunsekiho to sono mondaiten). Text in Japanese. Preprint, Japan Society of Analytical Chemistry, Tokyo, 5p., 1971. (Presented at the Nitrogen oxides Conference, 3rd, Tokyo, Japan, Jan. 22, 1971.)*

The nitrogen oxides concentration in automobile-exhaust gas changes with engine driving conditons. The concentration ranges from 10 to a few thousand ppm, and more than 95% of it is nitric oxide; nitrogen dioxide is very rare. Infrared absorption analysis, ultraviolet absorption, mass spectrometric analysis, and wet chemical analysis are used to determine nitrogen oxides in automobile exhaust. The first three are used for continuous NO analysis. Its use with a nondispersion-type ultraviolet analyzer allows the continuous analysis of a system containing both NO and NO2. The nondispersion-type ultraviolet analyzer can be applied to the system to convert NO into NO2 both for continuous and sampling analysis. Mass spectrochemical analysis is also utilized for continuous nitric oxide analysis. Phenol-disulfonic acid and Saltzman methods are employed in continuous wet chemical analyses. Also, an interference filter eliminates the effects of interfering components of coexistent substances in nondispersion infrared analyses excluding that of water: the water must be eliminated carefully with a desiccating agent. Drierite is widely used as the drying agent; however, the reaction converting NO2 into NO proceeds on the bed of the dryer. The regulation of exhaust has been changed from the concentration standard to the mass standard, so the sampling method does not require the swift response needed in the continuous process. However, constant volume sampling requires accurate analysis since it is applied to a diluted sample. The conversion of NO to NO2 in the sampling bag interrupts the NO2 analysis. The development of Chemiluminescence method is expected.

12980 APTIC NO. 30256

Yavorovskaya, S. F. and L. P. Anvaer

SEPARATE DETERMINATION OF MICROADMIXTURES OF ORGANIC SOLVENTS IN THE AIR BY THE METHOD OF GAS-LIQUID CHROMATOGRAPHY. *(Razdel noye opredeleniye mikroptimesey organicheskikh rastvoriteley v vozdukhe metodom gazo-zhidkostnoy khromatografii). Text in Russian. Gigiena i Sanit., 36(4):63-66, 1971. 7 refs.*

The possibility was studied of a separate determination of aromatic hydrocarbons in the air, including xylene isomers and other organic substances by gas chromatography. The concentrations of substances determined were not less than 0.003-0.005 mg/l. The chromatographs were provided with flame-ionization detectors. Several liquid phases and solid supports for a chromatographic column were tested. The preparation of samples and their introduction into the chromatograph is described. The optimum separation rate was obtained on polyethylglycoladipate, which was then used in all experiments. The column with NIISS sorbent enabled resolution of all three xylene isomers. The resolution of many component systems, where along with aromatic hydrocarbons polar compounds were present, was accomplished on polyethyleneglycol-600 as sorbent on a solid support TND-TS-M. A nine component mixture was resolved in this way completely. Calibration curves for nine component mixtures were plotted. Practical verification of the method was done on benzene vapor determination. The results obtained were in good agreement with those obtained by the nitration method.

12981 APTIC NO. 30191

Zimon, A. D. and K. A. Lazarev

SEPARATION OF FINE FRACTIONS OF DUST PARTICLES USING A VIBROSEPARATOR. *Ind. Lab. (USSR) (English translation from Russian of: Zavodsk. Lab.), 36(12):1906-1907, Dec. 1970. 4 refs.*

A vibroseparator is described that permits separation of polydispersed dust into fractions less than 5, 5-10, 10-20, and 20-30 micron. The device includes a diffuser and spreading disk. Separation of dust into fractions occurs on the diffuser surface due to elastic vibrations of the diffuser and spreading disk under the action of voltage transmitted through an audio oscillator. As the diffuser surface vibrates, fine particles are lifted upward and deposited in an accumulator. Coarse particles fall into another accumulator.

AIR QUALITY MEASUREMENTS

12982 APTIC NO. 30151

Tokyo Metropolitan Environmental Protection Research Inst. (Japan)

POLLUTIONS SHOWN WITH FIGURES, 1970 EDITION. *(Suji de miru kogai). Text in Japanese. 158p., March 1971.*

The Tokyo Metropolitan Government received 2601 complaints on air pollutants, such as sooty smoke, particulates, and gas. The sources of carbon monoxide are: automobiles, 99.7%; factories and generation stations, 0.1%; and airplanes, 0.2%. Nitric oxide is from: automobiles; 63.5%, factories and generation stations; and 0.6%, airplanes. Hydrocarbons are from: 97.9% automobiles; 1.6%, factories and generation stations; and 0.5%, airplanes. Sulfur dioxide is from: 1.0% automobiles; and 99.0%, factories and generating stations. Sulfur dioxide was monitored at nine spots in Tokyo; pollution worsened from 1968 to 1969, exceeding environments standards. In January 1970, the SO2 hourly maximum was 0.54, the minimum was 0.01, the incidence over 0.25 ppm was 2.1%, the daily maximum was 0.22, the minimum was 0.01, the incidence over 0.1 ppm was 20.8%, and the monthly average was 0.07. The hourly carbon monoxide maximum was 30, minimum was 2, the incidence of over 15 ppm was 4.7%, the maximum between 700 and 1500 hrs was 13.6, the minimum was 3.4, the incidence over 15 ppm was 0%, and the monthly average was 6.9 in front of the Metropolitan Government Office.

12983 APTIC NO. 30170

Osaka Environmental Pollution Control Center (Japan)

AIR POLLUTED SITUATION AND METEOROLOGIC ELEMENTS IN OSAKA. (THE SECOND REPORT). *(Osaka no taikiosen jokyo to kishoyoso. (Dai 2 ho)). Text in Japanese. 73p., March 1970. 13 refs.*

Sulfur dioxide, floating dust, wind direction, wind velocity, temperature, and humidity were estimated at 15 measured points on the Osaka plane. The correlation coefficient of the SO2 concentration at each measured point was not, in general, as high as that found in the first report and was from 0 to 0.5 (maximum, 0.77; minimum, 0.18). The air pollution potential of the following day can be forecast with high probability, using the forecasting weather map at 4:00 pm. Insolation has a great effect on air pollution; when the amount of insolation becomes more than 20 cal/sq cm/hr, the degree of pollution lowers gradually at any wind velocity. The data of the Izumiotsu station, the far southwest measured point on the Osaka plane, are useful for forecasting. On days of high concentration, the Osaka plane is the center of migrating high atmospheric pressure. When the difference in the inclination from the center of pressure is less than a few mb, the potential of air pollution is very high. The land wind blows from the northeast at the north part of the Osaka plane, from east at the center and from southeast at the south part, so on the whole, all winds are shifted to Osaka bay after converging at the center of Osaka City. Thus, the reason the midtown has a high concentration can be explained.

12984 APTIC NO. 30311

Japan Environmental Sanitation Center, Tokyo

REPORT OF THE INVESTIGATION ON POLLUTANTS IN THE AIR. *(Taiki osen busshitsu no chosa kenkyu hokokusho). Text in Japanese. 19p., April 1970.*

Suspended particulates were sampled twice a month by using high volume air samplers at nine National Air Sampling Network Stations (Sapporo, Tokyo, Kawasaki, Nagoya, Osaka, Kurashiki, Amagasaki, Ube, and Kitakyushu) from April 1969 to March 1970. The total amount of dust, organic substances, water soluble substances, and metal components in suspended particulate matter were investigated. For analysis of metal components, atomic absorption spectrophotometry was used. The results of the measurements showed the maximum and minimum values of every month and year, and the annual average value.

12985 APTIC NO. 30318

MAINTENANCE OF CLEAN AIR IN LATIN AMERICA. *(Luftreinhaltung in Lateinamerika). Text in German. Umschau (Berlin), 71(12):436- 437, 1971.*

Although domestic heaters, which do pollute the air, are needed in the warm climates of Latin American States, air pollution in the larger cities, such as Sao Paulo and Buenos Aires, is remarkable. In 1960 a communal commission for monitoring air pollution was created in Sao Paulo. In 1965, a grid of monitoring stations in the industrial center of the city was erected. Maximum dust concentrations of 25 to 35 g/cu m/month were measured. Contrary to Sao Paulo, other cities do not have monitoring systems. No automobile exhaust gas concentration measurements have been taken in the streets of Latin American cities. Major sources of air pollution, other than industry and cars, are bush fires, open air fires, and many small refuse incinerators.

12986 APTIC NO. 30346

Tokyo Metropolitan Environmental Protection Research Inst. (Japan), Atmosphere Div.

ON SURVEY OF AIR POLLUTANTS PECULIAR TO FACTORY-CLUSTERED AREA. *(Kojochiiki ni okeru tokuyu osenshitsu chosa ni tsuite). Text in Japanese. Tokyo-to Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot., vol. 2:109-111, March 1971. 4 refs.*

Ambient concentrations of nitrogen dioxide, ammonia and hydrogen chloride were measured during October 16-30, 1969 in Funawatari- cho, Itabashi-Ku, Tokyo, where a chemical factory and two pharmaceutical plants are located in close proximity, all discharging one or more of the measured gases. NO2 measured at a site north of the chemical factory was 3.3 pphm average, 10 pphm maximum and 1.0 pphm minimum while south of the factory the values were 3.0, 9, and 1.0. NH3 east of one pharmaceutical factory was 12 pphm average, greater than 30 pphm maximum and 3.0 pphm minimum; west of the factory the levels were 6.7, more than 30, and 0.9. Average maximum, minimum values of HCl east of the second pharmaceutical plant were 12 pphm over 40 pphm and 1.0 pphm; on thy west, they were 11, over 40 and 1.5. Average concentrations broken down by wind direction are shown. According to hourly variation curves shown for NO2, the concentration comparatively low for 0:00-6:00 hours, rises at about 6:00, and remains at the same level during daytime up to about 16:00. It then rises gradually to reach the day s peak at or about 19:00, starts declining from 22:00 to reach a low by 23:00, and then slightly increases again. The NH3 curve shows a 3-peak pattern; the first peak occurs at 5:00-6:00, the second at 10:00 11:00, and the third at 17:00-19:00. The HCl concentration reaches its peak after sunset.

12987 **APTIC NO. 30352**

Hyogo Prefectural Government (Japan)

RESEARCH ON FEATURES OF ENVIRONMENTAL POLLUTION IN THE EASTERN AREA OF HYOGO PREFECTURE. *(Hyogo-ken tobuchiiki ni okeru kankyoosen no tokusei ni kansuru kenkyu). Text in Japanese. 524p., March 1970.*

Atmospheric pollution, water pollution, and noise disturbance by planes were studied in the eastern area of Hyogo prefecture. Amagasaki City was selected for the atmospheric pollution study. The following items were reported: the amount of fuel consumption, the number of automobile holdings, the amount of traffic, the amount of dustfall, the concentration of sulfur oxides, the concentration of poisonous substances in automobile exhausts, atmospheric pollution, weather conditions, and the influence of atmospheric pollution on human bodies and metals. There was a strong correlation between the production income within Amagasaki City and the concentration of sulfur dioxide (PbO2 method), and between the concentration of sulfur oxides and the amount of dustfall. The daily and seasonal changes of the concentration of sulfur oxides and the amount of dustfall were affected by the weather conditions of the area. The investigation on the relationship between diseases and atmospheric pollution showed that when the daily mean pollution values were high, there were more patients, and that the number of cases increases in the following order: non-polluted area, in-between area, and polluted area. The quality of water of the Kanzaki River and the rivers that join the Kansaki, and the impurity of the sea area in the eastern part of the prefecture were also reported. To decrease impurity of the sea area, it is necessary to control the drainage from factories and to promote communal management of sewerage system of the city. The present situation and countermeasures for the noises due to the planes that take off and land at Osaka Airport were reported.

12988 **APTIC NO. 30408**

REPORT ON ACTUAL STATE OF AIR POLLUTION BY SULFUROUS ACID GAS IN 1969 IN TOKYO. *(Tokyo-to ni okeru 1969-nen no aryusangasu osen no genjo hokoku). Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), vol. 2:103-108, March 1971.*

Using sulfur dioxide concentrations measured and recorded automatically at eight permanent measuring stations in Tokyo during 1969, air pollution from SO2 was analyzed in relation to seasonal or meteorological factors. The yearly average SO2 concentration leveled off or slightly decreased in the last two or three years at all the measuring stations except one, Kojiya, where it is increasing. Concentration is generally higher in winter and lower in spring and fall. It also increases during the July-August period but not as high as in winter except for the Kojiya station, which shows an exceptional seasonal trend. At Kojiya, the high level usually observed in winter continues into spring and summer and goes as high as 0.1 ppm in August. The high SO2 is attributed to neighboring industrial districts such as Kawasaki and Tsurumi. The hourly SO2 variation is shown as well as the yearly occurrence of SO2 concentrations of 0.1 ppm or higher for one-hour values. The hourly average remains unchanged or decreased slightly in the past two or three years after recording a high in 1966 or 1967 at all stations except for Kojiya and Itabashi Higashi. Only four of the eight stations indicated a yearly average lower than 0.05 ppm, the legal limit.

12989 **APTIC NO. 30467**

Luedtke (Gerald) and Associates, Detroit, Mich.

AIR POLLUTION CONTROL. *In: The Highland Park Environmental Health Plan: Evaluation and Recommendations for Improving the Urban Environment. HUD Proj. Mich. P-265, p. 64-72, June 1970.*

NTIS: PB 195513

Air pollution in the Highland Park, Mich. area is discussed in terms of pollutants, control programming, and emission inventory. The primary pollutant is particulate matter; the major sources are coal or fuel burning, iron and steel manufacturing, chemical processes, and refuse burning. Other pollutants, such as sulfur dioxide, nitrogen oxides, hydrocarbons, oxidants, carbon monoxide, and benzo(a)pyrene, and their sources are also discussed. The major source for all these pollutants is fuel burning. An air-monitoring station was established in Highland Park, equipped with automated devices to continuously measure various pollutants. These results guide the emphasis of the air pollution control program. The Division of Air Pollution Control of Wayne County, Mich. has a permit system requiring all potential new pollution sources to be properly controlled. It also checks modified operations to see if they will need additional control features. An analysis made of pollutants found near a heavily travelled street is discussed. An emission inventory was also made in the city; no major sources of air pollution were found. Several recommendations are made for implementing the pollution control program.

12990 **APTIC NO. 30650**

Japan Society of Air Pollution

ANNUAL REPORT OF AIR POLLUTION, 1965. BASIC DATA FOR ESTABLISHMENT OF AIR POLLUTION STANDARD. *(Taikiosen nenpo, showa 40 nendo. Taikiosen no kankyo kijun settei ni kakawaru kisoshiryo). Text in Japanese. 260p., March 1968.*

To survey the actual conditions of air pollution throughout Japan, data were collected from 65 areas and arranged according to 15 items in the following standardized form: name of organization or department in charge of measurement; object of measurement, budget, and number of persons in charge; number of stations for air pollution measurement; kind of pollutants; number of factories controlled by the Smoke Control Law; number of factories not controlled by the law; population; number of registered automobiles; amount of fuel consumed/yr; amount of dust fall, including the mean value of three months, and the annual mean, maximum, and minimum values; sulfur dioxide gas as measured by the volumetric method, lead peroxide method, and alkaline filter method of air sampling; soot and smoke or suspended dust, including the mean value of three months, the annual mean, maximum, and minimum values in transmission and reflection coefficients, and the number or amount (mg/cu m) of particles; amount of suspended dust; and simple maps of the measuring stations. Titles of reports and publishers are also listed.

12991 APTIC NO. 30655

Japan Environmental Sanitation Association, Kawasaki

REPORT OF INVESTIGATION ON THE EFFECT OF WASTE GASES ETC. FROM MANUFACTURING FACTORY OF VINYL CHLORIDE PRODUCT. *(Enka-biniru seihin kakoseizo kojo kara no haigasu-to eikyo chosa hokokusho). Text in Japanese. 20p., Jan. 1968.*

In Nagano prefecture, crops damage due to waste gases was observed. An analysis of the pollutants in the waste gas from a factory, considered as the source, was made. At seven places within a 2.5 km radius of the factory, at the exhaust duct, and in the material mixture room of the factory, air was collected by a high volume air sampler and gas collecting device. The samples were analyzed using gas chromatography, the 1,2-dicarboxylic acid test method, and thin layer chromatography. The dust concentration in the factory was 17,200 155,000 microgram/cc m, 41.4 - 93.0% of which were DIBP, DBP and DOP, used as plasticizer. Within 1500 m of the windward and 2500 m of the leeward in the vicinity of the factory, one microgram/cc m of DIBP and of DBP were detected. The measured value was lower at 500 m from the generation source than at 700 m and 1400 m. This was considered to depend on the height of generation source and on the distance from the source. The plasticizer and the episplastic are harmful pollutants, especially DIBP. After this investigation, the waste gas control equipment in this factory was improved. More than 90% of the harmful materials can be removed by this improvement.

12992 APTIC NO. 30656

Japan Environmental Sanitation Center, Tokyo

SURVEY AND INVESTIGATION ON AIR POLLUTANTS. *(Taiki osenbusshitsu no chosa kenkyu hokokusho). Text in Japanese. 31p., April 1969.*

Suspended dust was collected twice a month for a year by high volume air samplers at seven national sampling stations. The total amount of dust, organic substances, soluble substances, and metallic components in the collected dust were analyzed. The mean value of the total amount of dust in the seven stations was 24.2 microgram/cu m; the average in Kawasaki City showed the highest value of 420 microgram/cu m. In Sapporo, the amount of organic substances was high, but sulfate and lead contents were low. In Tokyo and Osaka, all the values were almost same as the average values of the seven stations. The values of each component fluctuated with the total amount of dust. Kawasaki city showed the highest value in all items and had especially high amounts of SO4, manganese, iron, and copper. Manganese, iron, and nickel contents were high in Amagasaki, and iron was slightly higher in Kita-kyushu. The total amounts of dust and metallic components in Ube were less than in other cities. To check the accuracy of emission spectroanalysis, which was applied for this study, the limit of determination was investigated by the strontium internal standard method.

12993 APTIC NO. 30668

Ministry of Health and Welfare, Tokyo (Japan)

INTERMEDIATE REPORT ON THE RESULT AND MEASURES TAKEN AFTER THE SURVEY ON CADMIUM POLLUTION OF ENVIRONMENT IN AREAS SURROUNDING MINES AND SMELTERS. *(Kozan seirensho shuken chiiki cadomiumu kankyo osen chosa (kinkyu sotenken) no kekka to sochi ni tsuite). Text in Japanese. Chuken, Hokoku (Transactions Castings Res. Lab.), 10p., April 5, 1971.*

Several measurements were made in areas surrounding factories and mines which emit large amounts of mercury and cadmium. The maximum cadmium concentrations are reported for rice, paddy soil, the atmosphere, drinking water, river and sea water, stack gases, the bottom earth layer, agricultural products other than rice, fish, and shells. Thus far, no cases of itai-itai diseases of Cd poisoning have been found. Five areas showed more than 1.0 ppm of cadmium in rice. Farmers who retain such rice are guided not to eat it. The inhabitants of these areas will be given physical examinations when necessary. The three areas which exceeded 0.4 ppm cadmium are surveyed as to possible environmental pollution. Those areas which exceeded 0.1 microgram/cu m in the atmosphere, are surveyed to note any change in the pollution condition. Of the three areas whose drinking water exceeded 0.01 ppm, one will have a new well built in an unpolluted area. It is recommended that the emission from the mines and smelters in areas where environmental pollution by cadmium was observed be thoroughly controlled.

12994 APTIC NO. 30892

Akiyama, J., T. Takishima, and I. Hukushima

INVESTIGATION ON THE AIR POLLUTION IN ANNAKA DISTRICT. *(Gunmaken Annaka chiku no taiki osen ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):200, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, Tokyo, Japan, 1970.)*

Suspended dust particles and metal composition of the atmosphere were analyzed in three to 13 locations near the zinc refinery in Annaka City, Gunma Prefecture, during February 10-15, May 23-30, and October 10-17, 1969. Sulfur dioxide was captured every hour by an air auto sampler and measured by the rosaniline formalin method. Suspended dust particles were collected by a high-volume air sampler for two to eight hours during the test period and analyzed by atomic absorption spectrophotometry. Sulfur dioxide was more than 0.03 ppm for six days during the period of 15 days; the highest day average was 0.048 ppm. The particulate concentration was more than 300 micrograms/cu m for three days during the test period. Analyses showed an average of 0.03-0.19 micrograms/cu m of cadmium; 0.29-3.57 micrograms/cu m of lead; 1.37-12.16 micrograms/cu m of zinc; and 0.08-0.7 micrograms/cu m of copper. Leeward areas of the factory (south and east) were heavily polluted throughout the test period. Particulates showed heavy metal composition, but the concentration of Cd was lower than the environmental standard (0.08 micrograms/cu m).

12995 APTIC NO. 30645

Asami, Masukichiro, Shinobu Esaka, Sachiko Kusakabe, and Koichiro Kitazawa

SURVEY ON THE ATMOSPHERIC POLLUTION IN KYOTO-CITY. THE SECOND REPORT. *(Kyoto-fu ni okeru taikiosen chosa. Dai 2 ho). Text in Japanese. Kyoto-fu Eisei Kenkyusho Nenpo (Annu. Rept. Kyoto Prefect. Inst. Public Health), (15):117-125, Feb. 1971. 2 refs.*

The atmospheric pollution in Kyoto City was estimated at 12 stations. To estimate sulfur dioxide, an automatic estimation recorder was established at one station, the lead dioxide method at 11 stations, and the P-Rosaniline method at four stations. To estimate smoke and soot, a digital dust meter was set up at one station, and falling dust estimation was performed at three stations. Wind direction and wind gauges were established at five stations. Uji, Yawata, and Kumiyama showed the same SO2 concentration as that of the Kyoto-city area. A seasonal change was noted in the extent of pollution at all the spots of estimation. Yawata was of an urban type, Uji showed high concentration value in spring, Kumiyama was of a combination of the two, and at Otokuni and Tanabe the extent of pollution was generally low. The extent of pollution in September was the lowest. The fluctuations in estimation values by means of PbO2 method was examined in relation to the types and the height (14 m, 1.3 m) of shelters. As a result, the estimation values by means of shelters with efficient ventilation were always high. A considerable difference was noted between the values estimated at 14 m and at 1.3 m: the value estimated at higher spot was 1.36 times higher, on the average. According to the automatic estimation recorder, the smog phenomena that were observed in the mornings during the period between fall and winter, caused the formation of inversion layers. According to the P-Rosaniline method, SO2 in Nagaoka tends to rise from early morning until the sunset in winter, only in the mornings in spring, and in the afternoons in summer. Sulfur dioxide in Uji was highest around 10 am in winter and summer, and before the sunset in spring. In Kumiyama it began to rise in the afternoon in winter and no fluctuations were observed all day in spring. Pollution caused by smoke and soot did not seem to have increased. Falling smoke and soot was three to 10 ton/sq km per month, which a decline according to previous measurements. Correlation had been observed until 1966 between falling smoke and soot and the amount of rainfall; since then the correlation has not been clear. The pH of the rain was rather low in Kyoto-city, and the ash content ratio was higher in the suburbs.

12996 APTIC NO. 30270

Ball, Robert

FOUR YEARS EXPERIENCE IN TESTING CONNECTICUT AIR FOR SUSPENDED PARTICULATES. *Conn. Health Bull., 85(6):179-185, June 1971.*

The sampling of the air over Connecticut for suspended particulates is discussed. Suspended particulate concentrations was measured by means of a high-volume sampler; the sampling time was normally 24 hours over which approximately 2000 cu m of air were sampled. The filter was weighed before and after exposure and the increased weight was used to calculate the concentration in terms of mg/cu m of air. Summaries of four years of suspended particulate data analyses are shown in tabular form. Particulate air quality in most urban centers of Connecticut exceeded the standards, particularly in the industrial towns and larger cities. Only in the rural and residential areas are the air quality standards presently being met.

12997 APTIC NO. 30768

Eaton, Harold G.

MEASUREMENT AND REMOVAL OF FREON-TF FROM A SUBMARINE ATMOSPHERE: REPORT OF TRIP TO USS SALMON, SS-573. *Naval Research Lab., Washington, D. C., Chemical Dynamics Branch, NRL Problem C08-18, Proj. S 4632-002-12073, NRL Memo. Rept. 2182, 14p. Nov. 1970. 5 refs.*

NTIS, DDC: AD 716406

A Total Hydrocarbon Analyzer was used to determine possible contamination of a submarine atmosphere during the in-place cleaning of a motor generator with 1,1,2-trichloro-,1,2,2,-trifluorethane (Freon-TF). Overexposure to this solvent is reported to depress the central nervous system, injure the liver and kidneys, and cause unnatural heart action. The highest level of Freon-TF, 2.5%, in the ship s atmosphere was recorded in the bilge area, indicating that liquid Freon had collected in the area. Approximately 80 hours of ventilation with two blowers were needed to reduce the Freon-TF concentration to 10 ppm in the affected compartments.

12998 APTIC NO. 30398

Esaka, Shinobu and Masukichiro Asami

ON THE ESTIMATION OF VARIOUS POISONOUS GASES BY MEANS OF ALKALINE FILTER PAPERS. (PREANNOUNCEMENT) MEASUREMENT OF VARIOUS POISONOUS GASES CONCENTRATIONS IN THE SOUTH SUBURBS OF KYOTO. *(Arukariroshi ni yoru kakushu yugaigasu no sokutei ni tsuite. (Yoho) Kyoto nanko ni okeru kakushu yugaigasu no nodo bunpu sokutei). Text in Japanese. Kyoto-fu Eisei Kenkyusho Nenpo (Annu. Rept. Kyoto Prefect. Inst. Public Health), no. 15:112-116, Feb. 1971. 2 refs.*

The concentration distribution of sulfur trioxide, chloride, and nitrogen dioxide was investigated by means of the alkaline filter paper method. The areas studied were 43 cities and towns, including Uji-city in Otokuni district and Kymiyama town in Kuze district. Alkaline filter papers were suspended from the eaves of homes. The results of the estimation indicated that SO3 in Uji-area was 0.322, on the average; in Otokuni-area, 0.152; and in Kumiyama-area, 0.267. Chloride in Uji-area was 0.0074; in Otokuni-area, 0.0026; and in Kumiyama-area, 0.0062. Along the main roads and near rivers, the concentration was slightly higher. Nitrogen dioxide in Uji-area was 0.0191; in Otokuni-area, 0.0066; and in Kumiyama-area, 0.0188, showing that the polluted areas were limited to where the traffic volume was large. Although there are some problems concerning the use of alkaline filter papers, it was concluded that the method can be put to practical use to investigate the conditions of atmospheric pollution.

12999 APTIC NO. 30179

Fujiwara, Masahiro

STATUS OF AIR POLLUTION BY SULPHUR DIOXIDE IN JAPAN. *(Zenkoku no SO2 ni yoru taikiosen ni tsuite). Text in Japanese. Kogai to Taisaku, (J. Pollution Control), 7(4):325-339, April 1971.*

The nationwide sulfur dioxide air pollution statistics compiled for 1967 through 1969 are reviewed. The data was compared by year and locality, to determine the trends and nomological characteristics of pollution. Yearly pollution value averages are tabulated. Kawasaki, Yokkaichi, and Kitakyushu have improved during the past three years; Kawasaki from 0.1 ppm SO2 in 1967 to 0.06 ppm in 1969, Yokkaichi from 0.081 to 0.051, and Kitakyushu from 0.06 to 0.04, although they are still overpolluted. Sixteen cities including Sapporo, Tokyo, Nagoya, Osaka, and Wakayama, showed increased pollution. Stations with an overpollution value numbered 69 out of 138 in 1967, 67 out of 165 in 1968, and 83 out of 211 in 1969, representing 50%, 41% and 39% respectively. The relationship between the yearly average and the maximum one-hour value or the maximum daily average value was also studied. The nationwide trend of the SO2 air pollution is still increasing although it has considerably showed down. The six regulatory criteria set forth for control of SO2 air pollution are not consistent with each other. While the yearly average of 0.05 ppm is too lenient, the daily average of 0.05 ppm is too severe. The yearly average should be set at -.035 ppm to satisfy the other requirements, while the maximum one-hour value should be about 0.25 ppm. The yearly average maximum one-hour value ratio was 10.0 and yearly average maximum daily average ratio was 3.4. The maximum pollution density correlated with the time of day.

13000 APTIC NO. 30345

Funashima, Masanao, Saburo Fukuoka, and Toshio Ohiro

ON AIR POLLUTION BY SUSPENDED PARTICULATES. *(Tokyo-to ni okeru fuyu biryushi osen no genjo ni tsuite). Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot., vol. 2:12-19, March 2971. 6 refs.*

Suspended particulate pollution was analyzed using data obtained at four measuring locations (Tochomae, Joto, Kojiya and Toeiken) in the Tokyo metropolitan area for 1969 by means of a digital dust meter. This method was also compared with hi-vol sampler for two measuring locations, Kojiya and Toeiken. With the digital dust meter, the air sample is fed into a dark tube within which is a beam of light. The intensity of the scattered light caused by the suspended particulates is detected by a photoelectron amplifier tube. The photoelectric current is then converted to a pulse signal to measure the quantity of suspended particulates, indicated by the number of pulses per unit time. Dust from a site in Tochomae located near a driveway contains more bromine, which behaves similarly to carbon monoxide; indication that pollution from suspended particulates is affected by automotive emissions. Manganese behaves similar to sulfur dioxide, is more prevalent in the dust at Kojiya, indicating pollution of industrial origin. A lower concentration is indicated in the spring for all four locations possibly a result of more frequent winds with velocities of 3 m/s or higher. Particulates increased after the sunset in winter, probably caused by a temperature inversion. The morning peak takes place two hours earlier in winter than summer, a result of room heaters and other heating facilities in the neighborhood. The digital dust meter was not as reliable as the hi-vol sampler method. The correlation coefficient was extremely low at the Kojiya location while it was 0.786 at Toeiken, a high correlation. A difference in weather conditions and in the quantity of suction by the two samplers could result in the erratic correlation.

13001 APTIC NO. 30162

Hammje, K. and C. Schiller

AIR POLLUTION STUDIES IN THE DISTRICT OF HALLE, DUST SEDIMENTATION MEASUREMENTS. *(Lufthygienische Untersuchungen im Bezirk Halle, Staubsedimentationsmessungen). Text in German. Z. Ges. Hyg. Grenzg. (Berlin), 17(4):248-254, 1971. 6 refs.*

Between 1967 and 1969 the sedimentation and insoluble fraction of dust was measured with a Leuna-III-unit at 100 measuring points. The unit is made of PVC foil and has a collection surface of 0.25 sq m. It was filled with approximately 10 l distilled water. After exposure, the filtration device was attached and the water with the soluble and insoluble dust drained off. The filter was dried and the insoluble dust fraction weighed. Until 1964, the exposure time was two weeks, from 1964 on, one month. In 1964, glasses filled with 1000 ml distilled water and 30 ml formaldehyde were exposed between May and September, glasses with 500 ml distilled water and 15 ml formaldehyde between April and October, and glasses with 100 ml distilled water, 200 ml ethanol or propanol and 30 ml amylalcohol between November and March. The maximum allowable concentration of 15 g/sq m/day was exceeded at almost all points. At the most heavily polluted points it amounted to eight or ten times the limit concentration. A map of the measurement grid is given.

13002 APTIC NO. 30330

Hammje. K. and W. Rauh

AIR POLLUTION STUDIES IN THE DISTRICT HALLE, IMMISSION MEASUREMENTS IN THE INDUSTRIAL AREA OF BITTERFELD. *(Lufthygienische Untersuchungen im Bezirk Halle Immissionsmessungen im Industriegebiet von Bitterfeld). Text in German. Z. Ges. Hyg. Grenzg. (Berlin), 17(4):243-248, 1971. 11 refs.*

For measurement of the sulfur dioxide, nitrogen dioxide, and hydrogen sulfide emissions in the Bitterfeld industrial area, a measurement grid with 51 sampling stations was erected. Since a sampling time of 30 minutes was required, only 10 to 11 measurements could be taken each day. All 51 measuring points were covered by five routes; the starting point for each route was varied. The five measurement-taking tours were usually taken in the middle of the month within one work week. In the months of January and June the measurements expanded over two weeks to obtain 26 values for each measuring point. The program started in May 1967 and ended in April 1969. The air samples were taken with two subsequent impingers. The sampling speed was 5 to 7 l/min. The samples were evaluted by colorimetry. On the basis of the measurement results, two characteristic emission values were calculated for each component and compared with the corresponding maximum allowable emission concentration. In the whole industrial area, the emission concentrations of SO2 and H2S were inadmissibly high. Only the NO2 emissions were below the maximum allowable emission concentration. Necessary measures for reducing emissions have been initiated.

13003 APTIC NO. 30378

Hashimoto, Michio

ON POLLUTION FROM CADMIUM OF MIKKAICHI SMELTERS, NIPPON MINING CO. *(Nikko Mimmaichi seirensho no kogai to ni tsuite). Ministry of Health and Welfare, Tokyo (Japan), Public Nuisance Section, May 29, 1970.*

In May, 1968, itai itai disease came to be recognized by the Ministry of Health and Welfare as originating in cadmium pollution. 0Cadmium pollution of the Mikkaichi Smelter was observed for the first time in September, 1969. After the investigation by the Ministry, the area around the Mikkaichi Smelter was designated as requiring observation. The data of the investigation, which lasted a month, showed that floating dust was 160 microgram per 1 cu m, which is less than in Osaka or Tokyo. Tokyo s was 200 microgram and Osaka s and Kawasaki s was 250-280 microgram, sometimes reaching 400-500 or even 1000. The average cadmium content in Kurobe around the smelter, for a month, was 0.31 microgram, per 1 cu m. The average for eight hours a day, or shorter periods, was three to five times as much. The Ministry based its interim standards on eight to 12 hours (0.9-2.9 microgram were standards), although guidance was given to comply with a lower figure than the standard. A recheck will be made by the Ministry, using the equipment of the Ministry. Very high cadmium concentration was found in the soil. In 1968, a few traces up to seven ppm, averaging three ppm was found in the soil. In 1969, an average of 14.9 ppm, from 4.4 ppm to 53 ppm was found; 53 ppm was higher than that of Annaka. There is no standard for cadmium in soil. It does not necessarily follow that the highe the cadmium content in soil, the higher the cadmium content in rice. Cadmium in the soil does serve as an indicator of the cadmium pollution of air. Before the smelter introduced a Cottrell electric dust collector, in 1960, pollution must have been greater. If a man ate 380 g of rice, containing 1.31 ppm cadmium ever day, he would be taking 0.5 mg per day from rice. In the area here, the people eat more than 0.3 mg. However, opinions vary as to how much is a dangerous concentration. X-rays showed that one had a positive result. Sugar and protein in the urine were lower in the people in nonpolluted area. Of 24 people who had positive protein in the urine, 15 people s urine was analyzed for cadmium content. Per litre, there were 3.7-13 microgram, averaging 8.4 microgram, which is less than 30 microgram, thought to be the critical line by specialists. The residents in the Mikkaichi area can rest assured that there will never be itai itai disease case among them.

13004 APTIC NO. 30410

Hayafuku, Masataka, Kinshi Nakano, Hiroshi Yamazaki, and Rinko Nagata

ON NOX VARIATION BY ALTITUDE AS OBSERVED AT TOKYO TOWER. *(Tokyo tawa ni okeru chisso sankabutsu no kokobetsu henka ni tsuite). Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), vol. 2:20-27, March, 1971.*

Nitric oxide, nitrogen dioxide and suspended particulates of lead were measured at three different altitudes, (25 m, 125 m, and 225 m) during August 5-18 and December 1-15, 1969. Sampling was done every hour daily. The concentration (pphm) measured at each altitude for the summer period ranged from 30.0 to 1.0 average 4.6, at 25 m; 9.0 to 0.4, average 2.1, at 125 m; and to 7.8 to 0.7 average 2.2 at 225 m. The NO2 density ranged from 20.0 to 2.0 and averaged 5.5 at 25 m; 9.6 to 0.5 average 3.5, at 125 m; and 19.0 to 1.1, average 5.1 at 225 m. Winter measurements also given, as well as the hourly variations for August 9-10 and 11-12 and December 2-3 and 9-10. The relationship between NO or NO2 and Pb was also studied, and the effects of wind direction and velocity on NO and NO2 levels were analyzed. NO is higher at each altitude in winter than in summer while NOs is higher in summer than in winter. In winter, both NO and NO2 tend to decrease as altitude increases. This trend is not conspicuous in summer, possibly due to the instability of the atmospheric station. There appears to be a considerable correlation between NO or NO2 and Pb, although more winter surveys are needed. NO and NO2 levels of 5.1 pphm or higher occurred more frequently when the wind was southerly or calm than when northerly for the summer, while it occurred irrespective of wind direction during winter. NO tends to increase with a lower wind velocity but this is not necessarily so for NO2.

13005 APTIC NO. 30326

Hirafune, Kiyohiko, Masanao Takahashi, and Akira Sato

STUDY ON THE ENVIRONMENTAL POLLUTION AT IWATE PREFECTURE. NO 13. METAL COMPONENTS IN ATMOSPHERIC PARTICULATE MATTER (ON THE RESULTS OF MEASUREMENT AND THE REGIONAL CHARACTERISTICS OF SEVERAL CITIES IN THE PREFECTURE). *(Iwate-ken no kogai ni kansuru kenkyu. Dai 13 ho. Taikichu fuyu funjin no kinzoku seibun (kennai shotoshi no sokutei kekka to sono chiikitek tokusei ni tsuite). Text in Japanese. Iwate-ken Eisei Kenkyusho Nenpo (Ann. Rept. Iwate Inst. Public Health), no 13:86-98, 1969. 22 refs.*

Results are given for measurements of metal components (iron, manganese, copper, lead, cadmium, calcium) in atmospheric particulate matter in several cities of Iwate Prefecture) (Morioka, Miyako, Kamaishi, Ofunato, and Higashiyama. The regional characteristics of each city are stated. High volume air samplers continuously measured for 24 hrs atomic spectrometry analyzed the metal components. For Morioka, which is non industrial with no particular pollution source, the metal concentration, on the whole was low and Cd was hardly detected. Miyagi, an industrial and fishing city and site of a metal refinery, showed high concentrations compared with the other cities: Mn, 0.68-5.80 microgram/cu m; Cu, 0.10-0.39 microgram/cu m; Pb, 0.42 3.67 microgram/cu m; Cd, 0.24-0.143 microgram/cu m. Kamaishi, an iron and steel Center, showed high Fe concentration, and the Matsubara district, adjacent to the pollution source, was locally polluted with Fe (68.51 to 89.73 microgram/cu m) and Mn(0.95 to 6.73 microgram/cu m). In Ofunato and Higashiyama which contain cement factories, Ca concentration was especially high (16.23 to 54.66 microgram/cu m in Ofunto, adjacent to the source, and 25.22 to 82.94 microgram/cu m in Higashima within 0.5 km from the source).

13006 APTIC NO. 30455

Ingels, Raymond M., Walter J. Hamming, S. Smith Griswold, Raymond G. Holmes, and Robert L. Chass

TRENDS IN ATMOSPHERIC CONCENTRATIONS OF OXIDES OF NITROGEN 1957-1961. *Los Angeles County Air Pollution Control District, Calif., Engineering Div., 47p., Aug. 1962. 10 refs.*

Nitrogen oxides concentration levels were measured by various locations in Los Angeles County. Monthly average of daily maximum total NOx concentrations were used to give linear trend lines, de-seasonalized trends, and frequency distributions. The average frequency of occurrence at alert levels were developed for future dates. For example, if emissions increase to four times the present rate, alert concentrations would occur nearly every day in December and January, if all other conditions remained the same. The total NOx concentrations recorded by seven air monitoring stations increased slightly over the 1957 to 1960 period, but the trend lines were only statistically significant at two locations. The relationship between location, weather, emissions, and NOx concentrations was quite complex. Wind direction and speed, inversions, and seasonal effects were noticed.

13007 APTIC NO. 30379

Ito, Katsusada

AIR POLLUTION IN TOKYO. *(Tokyo-to no taiki osen). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 4(3):211-214, Oct. 1970. (Presented at the National Council of Air Pollution Studies, General Meeting, 10th, Japan, 1969.)*

The general picture of air pollution in Metropolitan Tokyo is discussed. In the past eight years (apparently up to 1969), the lowest yearly average of sulfur dioxide density was 0.04 ppm recorded for 1964, and the highest was 0.077 ppm for 1966. The figure, which remained low in 1962, 1963, and 1964, showed an increasing trend for the years 1965 through 1969. The yearly averages of SO2 density in various cities for comparison purposes were 0.1 ppm for Chicago, 0.1 ppm for Kawasaki, 0.62 ppm for Washington, and 0.082 ppm for Osaka, against 0.074 ppm for Tokyo. The highest one-hour values were 1.14 ppm for Chicago, 1.11 ppm for Kawasaki, 0.62 ppm for Washington, 0.52 ppm for Osaka, and 0.5 ppm for Tokyo. Although this type of simple comparison requires further analysis of the data as to how, where and when measured, it does show the general picture of air pollution in these cities. More important, however, are the countermeasures being taken to check the air pollution in the respective cities. A table is shown listing the dates and times for the smog warnings issued in Tokyo since 1965. According to the table, the warnings were mainly issued in November through March, indicating the seasonal trend. But this trend only represents the past years and cannot readily be applied to future years. In fact, high SO2 density has been recorded even during the early summer and the ensuing months of August and September. According to the SO2 density values measured at Tokyo Tower, the value is higher at the altitudes of 125 m and 225 m when a southerly wind is prevailing, and lower with a northerly wind. No difference was noted with wind direction at a 25 m height. This may indicate that an air current of high SO2 density is moving with a southerly wind in the upper atmosphere over Tokyo, and that SO2 discharged from high chimneys in the industrial district south of Tokyo is carried into Tokyo by the wind. Considering only SO2 pollution in Tokyo, the polluted area is becoming wider, indicating that sources of the pollution ar located not only in Tokyo, but also outside of it. This makes it necessary to take countermeasures through inter-prefectural cooperation.

13008 APTIC NO. 30422

Iwasaki, Koyo, Saburo Fukuoka, and Toshio Ohira

ON THE RESULTS OBTAINED FROM REGULAR, CONTINUOUS MEASUREMENT OF AUTOMOBILE EXHAUST GAS AT OR ABOUT THE USHIGOME YANAGICHO INTERSECTION. *(Ushigome Yanagicho kosaten fukin ni okeru jidosha, haikigasu joji sokutei kekka ni tsuite). Text in Japanese. Tokyo-to Kogai Kenkyu sho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), vol. 2:62-67, March 1971.*

The Usigome Yanagicho intersection is one of ten places where carbon monoxide is measured regularly 24 hours a day. The 3-month period from August to October 1971 is reported. Measurements were made at three selected points: A, located at one corner of the intersection; B, about 50 m south of A and on the side of the street; and C about 100 m east of B and also on the side of another street. An automatic sampler combined with a non-dispersive infrared analyzer was used; sampling lasted 15 min with a 5 min break. The flow rate was 1 liter/per min. The averaged total of the four 15-min values was taken as a hourly average. The hourly and 3-month average CO concentrations are shown for all three measuring points. For points A and B, the graphs indicate that September shows a higher hourly value than August and October. At point C, the value for daytime remained practically constant at about 5 ppm for three months but the nighttime value is higher for September than for August and higher for October than for September. This phenomenon may be related to the frequent atmospheric inversions that occur in October. The CO concentration was highest at 9 am and 6 pm, the rush hours. A correlation between the quantity of the automobiles and the CO concentrations was observed in traffic up to 2000 vehicles per hour; beyond this traffic level, of traffic, the correlation was poor. Daily patterns of the CO concentration and wind direction are also reported.

13009 APTIC NO. 30858

Kahl, Hermann and Walter Muschter

THE SITUATION IN THE HYGIENE OF THE AIR OVER THE CAPITAL OF THE GDR. *(Zur lufthygienischen Situation der Hauptstadt der DDR). Text in German. Wiss. Z. Humboldt Univ. Berlin Math. Naturw. Reibe, 19(5):535-537, 1970.*

Dust fall in East Berlin was measured from 1961 to 1968 by 100 measuring stations, thereafter the number of stations was reduced to 36. The results were divided into five concentration categories and plotted on a map. A median dust fall of 10-25g/sq m/30 days characterizes center city Berlin, Johannisthal, and Adlershof. The neighborhood near the gas works and the industrial areas of Lichtenberg and Rummelsburg had a dust fall of 30 to 90 g/sq m/30 days. In districts with heavy pollution, the dust fall level of 20 g/sq m/30 days was exceeded in 50 to 100% of the instances. Over an eight year period 23% of all monthly averages exceeded the maximum permissible emission value. The peak dust fall for all of East Berlin was reached in 1963 with 27 g/sq m/30 days. Sulfur dioxide emissions were measured from 1966 to 1968 by 40 measuring stations every 15 minutes between 800 and 1600 hours. Results were evaluated for the entire three year measuring period for the use of domestic heating. Sulfur dioxide concentrations during the heating period were divided into five categories; peak emission was in center city. A close correlation existed between SO2 emission and population density. The MIC sub D value was exceeded during the heating period in 62% and during summer in 20% of the instances. The MIC sub K value of 0.5 mg/cu m was exceeded in winter in 7.5% and in summer in 0.5% of the instances. Daily SO2 emission averages, suspended dust, and dust lead content were measured in 10 stations. Suspended dust was, during the heating period, 50% above that of the summer. The mean daily SO2 levels were about half the short-time measurement levels. Both SO2 and suspended dust concentrations decreased from center city towards the periphery. Lead concentrations of three to six mcg/cu m were found in heavily polluted areas.

13010 APTIC NO. 30182

Kawai, Senzo, Toshio Sasaki, Susumu Takada, Shinobu Ashida, Toyoko Nonomura, Yasunori Takenobu, and Susumu Kitazawa

ON THE CONTENTS OF POLYCYCLIC AROMATIC HYDROCARBONS AND METAL COMPONENTS IN FLOATING DUSTS UNDER DIFFERENT PARTICLE SIZES. *(Fuyufunjin no ryukeibetsu takan hokozoku kagobutsu oyobi kinzoku seibun ganyuryo ni tsuite). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan J. Public Health), 17(2):168, Oct. 1970. (Presented at the Japanese Society of Public Health, Annual Meeting, 28th.)*

The levels of dust in the air, the size distribution of dust, the metallic components in the dust, and the levels of PAHC (polycyclic aromatic hydrocarbon) were determined on the roof of a building in Kyoto City for 27 days in February and March 1970. A high volume air sampler and a hi-vol sampler with a cyclone (Cy-HV), a digital indicator, and a cascade centrifuge were used. Although the levels of airborne dust usually vary with the measurement method in this case with the exception of the digital indicator, there was little difference. Large dust decreased remarkably on rainy days. The levels of metallic components in airborne dust showed high levels of cadmium and lead in small dust particles and iron, nickel, manganese, chromium, and copper in large dust. The levels of PAHC in small sized dust were three to 20 times as high as those in large sized dust. The levels of PAHC in the soot from chimneys were lower than those in airborne dust and were higher for coal than other fuels.

13011 APTIC NO. 30367

Kishi, Hikohei, Kazuo Okajima, and Toshikatsu Uchida

CONDITIONS OF AIR POLLUTION IN FUKUI CITY– SULFUR OXIDES AND NITROGEN DIOXIDE. *(Fukui-shi ni okeru taikiosen no jokyo-- iousankabutsu to nisankachisso). Text in Japanese. Fukui-Ken Eisei Kenkyusho Kenkyu Hokoku (Rept. Fukui Prefect. Inst. Public Health), no. 4:12-30, May 1970.*

Atmospheric concentrations of sulfur oxides and nitrogen dioxide were measured from June 1967 to January 1970 in Fukui, where there are no specific or large sources of pollution. The lead peroxide candle and alkaline filter paper measurement methods were used. Sampling sites were on the rooftops of the Fukui Prefectural Institute of Public Health (No. 1), the Fukui City Health Center (No. 2), the Fukui Courthouse (No. 3), and on a sidewalk (No. 4) contiguous to Institute of Public Health. Sulfur oxide values at sites 1, 2, and 3, are measured by the PbO_2 method, were within a range of the first level (0.5-1.0 SO_3 mg/day/100 sq cm PbO_2) according to the Terabe s standard for judging the degree of air pollution. Concentrations tended to vary with the season, being high in winter and low in summer. Sulfur oxide levels increased when wind direction was northeast at site No. 1 and northwest and northeast at No. 2 and 3. The values of sulfur oxides measured by the alkaline filter paper method were 65-76% of those by the PbO_2 method. Concentrations of NO_2 at site No. 4 were higher than those at other 3 sites, which showed almost the same levels.

13012 APTIC NO. 30713

Mammarella, L. and A. Biondi

AIR POLLUTION IN THE CITY OF ROME. (A MULTISEASONAL CONTROL OF THE NUMBER OF GRANULES AND OF THE CONCENTRATION OF AEROSOLS USING A SYSTEM OF SEVERAL INSTRUMENTS). *(L inquinamento atmosferico della citta di Roma). (Controllo pluristagionale della granulometria e della concentrazione degli aerosoli attraverso l impiego di un sistema di piu apparecchiature). Text in Italian. Nuovi Ann. Igiene Microbiol. (Rome), 20(3):208-237, May-June 1969. 53 refs.*

Results of a 12-month study of aerosol pollution in Rome are presented. Sampling procedures permitted both evaluation of the total amount of pollutants and subdivision according to size. A continuous sampler for coarse aerosols, a continuous filter for total aerosols, and a 4-stage differential sampler were used. The intake of various particle sizes during different periods of the year, as well as their concentration, were compared, and some indices concerning the morphology of the sampled aerosol were derived.

13013 APTIC NO. 30602

Martin, A. and F. R. Barber

SOME MEASUREMENTS OF LOSS OF ATMOSPHERIC SULPHUR DIOXIDE NEAR FOLIAGE. *Atmos. Environ., 5(5):345-352, May 1971. 4 refs.*

When continuous recordings of atmospheric sulfur dioxide were made, low values were obtained at a site which had its air intake close to a large hedge. Recordings were made simultaneously above and close to the hedge, allowing actual losses to be assessed. It was found that significant amounts of SO_2 can be lost near foliage by adsorption on wet surfaces, particularly at night, and by gaseous assimilation through the stomata in the daytime. The effect was present at 150 mm above the hedge, but not at 0.5 m. It is essentially a boundary effect. Air passing through the foilage will be partially desulfurized when the hedge is wet or active. The loss at 150 mm above the hedge can be all of the input up to six parts per hundred million. With greater temporary inputs, the loss does not exceed six parts per hundred million, probably because of partial or temporary stomatal closure in these conditions. The greatest losses occur in rain or dew or when the open air is fairly warm. Zero loss can occur when the hedge is too cold, too dry, wilting, or suddenly fumigated. (Author conclusions modified)

13014 APTIC NO. 30238

Ogata, Masana, Junko Omori, and Koichi Osaki

ON ANALYSIS OF CONCENTRATION OF SULPHUROUS ACID GAS BY AN AUTORECORDER. *(Atorekoda ni yoru aryusangasu nodo no kaiseki ni tsuite). Text in Japanese. In: An Outline of countermeasures against public nuisance in Kurashiki city. (Kurashiki-shi ni okeru kogaitaisaku gaiyo). Kurashiki Municipal Office (Japan), Public Nuisance Section, p. 101-110, Dec. 1968.*

The concentration of sulfur dioxide in the Mizushima area, Kurashiki city, Okayama prefecture, for 1967 was estimated by an autorecorder, recorded by a computer, and analyzed. The two sites were flat ground, and mountain trail. The wind caused a high SO_2 concentration and blew from west to south in both the cases. The velocity of the wind was two to four m/sec at ground level and two to 10 m/sec in the mountains. As the wind hit the hillside and turned, even with a high velocity, SO_2 collected and caused a high concentration on the mountain. The wind, which caused a concentration of more than 0.02 ppm, was from the S, SW, and SSW, and the velocity was two m/sec on the flat ground, and the wind was from the SSW and SW, and the velocity was three m/sec on the mountain. The highest values were obtained in the period between noon and 6 pm during the year. Values also varied with the seasons.

13015 APTIC NO. 30746

Petrilli, F. L. and S. Kanitz

ON THE ATMOSPHERIC POLLUTION OF THE CITY OF GENOA. *(Sull inquinamento atmosferico della citta di Genova.) Text in Italian. Giorn. Igiene Med. Prev. (Genoa), vol. 3:83-106, 1962. 12 refs.*

The methods and results are reported of air pollution measurements made in Genoa from 1954-1961, with particular reference to dustfall, suspended matter, and sulfur dioxide. (Author summary modified)

13016 APTIC NO. 30724

Robinson, E., L. A. Cavanagh, F. L. Ludwig, and R. C. Robbins

ATMOSPHERIC CARBON MONOXIDE CONCENTRATIONS OVER THE NORTH ATLANTIC OCEAN. *Preprint, American Chemical Society, Washington, D. C., 6p., 1970. (Presented at the American Chemical Society National Meeting, 159th, Houston, Texas, Feb. 1970.)*

Carbon monoxide concentrations were measured during the autumn of 1968 on an eastbound voyage across the North Atlantic and on the return westbound voyage. The measurements were made by passing dried air through a hot mercury oxide cell, where any CO present in the sample reduced the mercuric oxide and quantitatively released mercury vapor. The latter was detected by its absorption of the ultraviolet from a mercury lamp. Measured concentrations on the eastbound voyage averaged about two-tenths ppm for the first four days, then suddenly increased to more than 2.5 ppm, followed by a gradual decline to 0.4 ppm. On the return trip, there were larger and more rapid increases in CO. The increases were associated with frontal passages that were usually marked by wind shifts and minimum pressure. The observed levels suggest the existence of an ocean source for CO.

13017 APTIC NO. 30708

Stratmann, D. and H. Ixfeld

SULFUR DIOXIDE IMMISSION MEASUREMENTS IN THE STATE OF NORDRHEIN WESTFALEN. *Preprint, State Inst. for Emission in Nordrhein- Westfalen (West Germany), 15p., 1970. 8 refs. Translated from German.*

Since 1964, sulfur dioxide emission measurements have been carried out in large sections of North Rhine-Westphalia, especially industrial centers in the Ruhr and along the Rhine, in accordance with the state s Emission Protection Statutes. Because of the size of the area and the number of measuring locations, the descriptive parameters of sulfur dioxide emissions are ascertained by random measurements in conjunction with spatial spot checking of unit surfaces one sq km in size. The results are reproduced in cartographic overviews (not included) and in tables (three of which are included). A clear increase in SO2 emissions was observed during the current (fifth) measuring year. This is in contrast to a constant decrease observed in earlier years. The trend toward higher emissions was confirmed by specialized comparative investigations of emission levels and their periodic fluctuations in the Ruhr district.

13018 APTIC NO. 30409

Udagawa, Mitsuru and Saburo Fukuoka

ON AIR POLLUTION BY NOX. *(Chisso sankabutsu no osen jokyo ni tsuite). Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), vol. 2:1-11, March 1971.*

Air pollution by nitric oxide and nitrogen dioxide is discussed based on data obtained at four measuring sites in the Tokyo metropolitan area. The yearly average level of NO measured near a driveway increased from 8 pphm in 1965 to 12 pphm in 1969 while the NO2 increased from 2.2 pphm to 5.9 pphm. In another location a residential area there was no significant increase. The occurrence frequency of high sulfur oxide and sulfur dioxide recorded at the driveway and residential sites was also analyzed. The increase in the yearly average is not as conspicuous for the area behind the driveway but, based on the occurrence of high-density pollution, it is now increasingly likely that the area can be polluted as much as the driveway itself, depending on meteorological conditions. Study of the hourly degree of the pollution indicated that NO has a double peak pattern, one at 8-9 AM and the other at 6-8 PM, representing the rush hours, where as NO2 has a single-peak pattern throughout the year and shows a comparatively flat curve throughout the day. The NO level is always higher than NO2 throughout the day. Pollution by NO is more frequent in the fall and winter. Results of a study of the relationship between high NO or NO2 and wind direction are also given.

13019 APTIC NO. 30430

Wytt, Carolyn De and J. P. Kevany

AIR POLLUTION IN IRELAND. *Irish J Med. Sci. (Ireland), 140(3): 108-117, March 1971. 16 refs.*

Air pollution as a modern environmental hazard is described and an analysis of data is presented for Dublin and Cork during the period 1963 to 1969. Sources of air pollution are divided into three main categories: industrial, domestic and institutional, and transportation. Power stations, heavy industrial units, and chemical manufacturing products are some of the most prominent components in the first category, and are a constant source of pollution throughout the year. Domestic and institutional sources make a substantial contribution to air pollution in many cities in the temperate zones, particularly in high density residential areas during the winter months. Transport represents a growing contribution, especially in congested urban areas, and is relatively constant throughout the year. Analysis of the Dublin and Cork data comprising smoke and sulfur dioxide concentrations indicates a serious problem in both cities, to which domestic heating makes a major contribution. Daily measurements showed seasonal variations. Proposed regulations for pollution control in 1971 do not affect this source of pollutants. The composition of pollution in both cities is changing, and further research is needed to establish the cause of this. More recording stations are required to improve the coverage of the present monitoring system. (Author summary modified)

13020 APTIC NO. 30309

Yagyu, Hiroshi, Syusuke Kurashina, Shigeto Suzuki, and Yasuhito Sato

CORRELATION AND FACTOR ANALYSIS OF AIR POLLUTANTS IN TOKYO. *(Tokyo -to ni okeru kakushu taikiosenbusshitsukan no sokan oyobi inshi bunseki). Text in Japanese. Tokyo-Toritsu Eisei Kenkyusho Nenpo (Annu. Rept. Tokyo-to Lab. Med. Sci.), no. 21:115-127, 1969. 3 refs.*

Yearly fluctuations, arrangements, and groupings of various air pollutants were determined from wind speed, temperature, moisture, sulfur dioxide, nitrogen dioxide, nitric oxide, dust, oxidant, carbon monoxide, and hydrocarbon, obtained at Tokyo National Air Sampling Network Station during 1968. An arrangement and a grouping of air pollutants could be made by the methods of the coefficiency of belonging and the least squares after distribution of the condition of air pollution taking 30 ppm of CO concentration as a datum. The suitability and reliability of the results were proved by the method of canonical analysis. In addition, an arrangement and a grouping were made when a smog alarm was officially announced. Each air pollutant showed specific patterns of the seasonal vicissitude. Pollutants and meteorological factors exhibiting similar behavior fell into three groups: SO2 and NO2, CO and hydrocarbons, and temperature and moisture. Carbon monoxide acted with NO and hydrocarbons in the case of high CO concentrations, however, in the case of low CO concentrations, CO showed fluctuations similar to those of SO2 and NO2. Dust fluctuated similarly to NO and HC in the case of low concentration of CO. Thus, an arrangement and a grouping of air pollutants could be made by the methods of the coefficiency of belonging and the least squares from the correlation coefficient between air pollutants, by the method of canonical analysis. A smog alarm is officially announced taking SO2 as a main indicator, however, it is proposed that dust, CO, and O3 should be added to SO2. Based on the canonical analysis, only a few air pollutants might contribute to smog formation.

ATMOSPHERIC INTERACTION

13021 APTIC NO. 30313

REACTIONS IN THE ATMOSPHERE. *Preprint, American Inst. of Chemical Engineers, New York, 20p., 1971. 8 refs. (Presented at the American Institute of Chemical Engineers Workshop, Integrated Engineering Solutions to Overall Pollution Control: Air, Water, and Solid Waste Problems, Detroit, Mich., April 13-15, 1971.)*

Examples are presented of thermal, photochemical, and heterogeneous reactions present in the atmosphere. The writing of rate equations is outlined under the following main headings: origin of chemical rate studies, modern theories of the rate of a chemical reaction, and description of reacting systems. Photochemical reactions in the atmosphere are outlined according to the time sequence of their four main steps: radiation, absorption, primary reactions, secondary reactions.

13022 APTIC NO. 30644

Osaka Environmental Pollution Control Center (Japan)

AIR POLLUTED SITUATION AND METEOROLOGIC ELEMENTS IN OSAKA. (THE FIRST REPORT). *(Osaka no taikiosen jokyo to kishoyoso. (Dai 1 ho)). Text in Japanese. 59p., March 1969. 15 refs.*

On the basis of the data observed on sulfur dioxide and local meteorological elements measured by the air pollution observation system of Osaka Prefecture, the tendency of air pollution and weather in Osaka was investigated. The data are those from November, 1968 to December, 1969. The large factories were concentrated in the west and the south-west areas of Osaka plain facing the sea. The wind direction, in the daytime, was mainly sea wind from the west. The sulfur dioxide concentration was highest in the center of Osaka City and it lowered gradually from the sea-side area to the suburbs. The amount of pollution in January and February was lower than that in November and December. This difference was caused by the seasonal wind. In the suburbs and along mountains, the SO2 concentration has a time lag, on days of high pollution concentration, compared with the sea-side area or in the midtown. The pollution in the midtown was carried to the suburbs. On the days of a high pollution concentration, the main wind directions were north-east at ground level, south at 300 m, and west at more than 500 m. The wind velocity was about five m/sec at 1000 m. On the days of a low pollution concentration, few differences are seen among the wind directions of each height. On days of high concentration, when the smog alarm was issued, the distribution of high potential atmospheric pressure on air pollution for at least two days was seen. By selecting several points as typical among several observation stations, the prospect of grasping the conditions of all areas was given.

13023 APTIC NO. 30652

Sendai Municipal Office (Japan), Dept. of Hygiene

RESEARCH ON MAKING AN AGREEABLE ENVIRONMENT - A REPORT. *(Kaiteki na toshi kankyo ni kansuru kenkyu chosa hokoku). Text in Japanese. 30p., March 1968.*

To make an agreeable environment in Sendai City, Japan, three basic data were considered: an experiment concerning the diffusion of contaminated matter in the atmosphere from the use of uranine; the diffusion of drainage water in the sea; and weather observations. The investigation of the diffusion of atmospheric contaminated matter was made by injecting uranine, as a tracer, into a 34-m high chimney. The collection of uranine on the ground by a fluorescent photometer was then measured. In this way, the state of distribution was examined. In the direction SSE to ESE downwind from the source, there was a zelkova and cedar wood. The extent to which the contaminated matter was arrested by the green belt was examined. A point 200 m from the source showed the highest concentration; the greatest distance that the contaminated matter travelled was 1250 m. Because the wind blew from the NW, and because the period of investigation was in March and there were many diciduous trees in the area, it was not possible to fully determine the effects. The investigation of the diffusion of drainage water was made by disolving four kg of uranine in water and then pouring it into the River Hikita at a point 400 m from the estuary. The diffusion state of uranine was filmed from the air, and water from 36 points at sea was sampled. The rate of diffusion was 100,000 to 1,000,000 sq cm/sec and it showed a tendency to spread north from the estuary. Future investigations are needed to consider the seasonal change in sea currents and current velocity. The weather report was made by analyzing the data between January and December of 1966. A map of the woods and winds was made showing the monthly differences after investigating the median of hourly and monthly wind velocities. The wind direction was NW in winter and SE in summer, and thus showed opposing effects The building of the new Sendai seaside industrial belt is not expected to effect the city center as it is in the westerly direction, but the residential area to the northwest may be effected.

13024 APTIC NO. 30653

Anti Pollution Council of Tokyo-To, and Chiba, Saitama, and Kanagawa Prefectures (Japan)

SUMMARY OF THE RESULT OF INVESTIGATION ON AIR POLLUTION IN TOKYO AND OTHER THREE PREFECTURES (CHIBA, SAITAMA, KANAGAWA). *(Itto sanken taikiosen chosa kekka no gaiyo). Text in Japanese. 18p., March 1969.*

An investigation on the tendency of air pollution phenomena covering the area of Tokyo, Chiba, Saitama and Kanagawa was made from 1965 to 1968. The concentration of sulfur dioxide by the conductivity method and the p-rosaniline method, the amount of dust fall by deposit gauge, the wind direction, the wind velocity, and the temperature by height were measured for 14 days each summer and winter. When the concentration of sulfur dioxide was more than 0.1 ppm, the wind direction was generally south or east. However, at Ichihara City, Chiba Prefecture, the wind direction was from the north or northeast; it was apt to diffuse to each direction in winter as compared with summer. At these times, the wind velocity was 3-16 m/sec in summer and 0-3 m/sec in winter. In the littoral area, despite strong winds, a high concentration of pollution appeared more often than in the inland area. When the transmittance of dust fall was more than 30%, it was difficult to find characteristics on wind direction. It is believed that these phenomena depend on some meteorological condition other than wind direction and velocity. The flow condition of sulfur dioxide is shifted from the littoral area to the inland area by south or south-west winds in summer; but in winter, locally high concentrations are often found. An annual increase of SO2 was not found, but in the midtown areas of Jonan, Joto, and Tokyo, and in the littoral areas in Kawasaki and Kanagawa, a concentration of more than 0.05 ppm (daily average) was observed more than 50% of the time. Dust fall decreased or remained the same and in littoral areas a remarkable decrease was seen.

13025 APTIC NO. 30274

Ackerman, R. A., I. Rosenthal, and J. N. Pitts, Jr.

SINGLET OXYGEN IN THE ENVIRONMENTAL SCIENCES. X. ABSOLUTE RATES OF DEACTIVATION OF 02 (1 DELTA G) IN THE GAS PHASE BY SULFUR COMPOUNDS. *J. Chem. Phys., 54(11):4960-4961, June 1, 1971. 17 refs.*

Rate constants are reported for the gas phase deactivation of molecular oxygen in its lowest-lying electronically excited state by five sulfur compounds whose volatility was sufficiently high to allow study in a discharge flow system. Argon was used as the dilutant, while the quenching agents of singlet oxygen included ethyl sulfide, methyl sulfide, methyl disulfide, methyl mercaptan, and thiophene.

13026 APTIC NO. 30887

Altomare, Philip M.

THE APPLICATION OF METEOROLOGY IN DETERMINING THE ENVIRONMENTAL EFFECTS OF EVAPORATIVE HEAT DISSIPATION SYSTEMS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 29p., 1971. 6 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 64th, Atlantic City, N. J., June 27-July 2, 1971, Paper 71-56.)*

The effects of thermal discharges turns attention towards the application of spray ponds and wet cooling towers when large quantities of waste heat are involved. Environmental effects include fog formation, icing, large visible plumes, and interaction with other atmospheric contaminants. The potential for inducing fog formation depends on the local conditions under which fog occurs and the contribution of vapor at ground level from operation of a waste heat dissipation system. To determine these local conditions, meteorological data tapes are processed to determine those parameters which best describe the conditions of natural condensation of water vapor. From these data, an analytical model relating the local occurrence of fog to such parameters as wind speed and relative humidity is obtained. Applying hourly meteorological data records in models of plume rise and atmospheric dispersion, the contribution to ground level moisture content of the air from alternative evaporative cooling systems is calculated to determine the increases in probability of fog occurrence. The effect of increased probability of fog formation is presented for several alternative systems and is greatest for those heat dissipation systems which have the lowest plume rise. Spray systems and mechanical draft towers, which have lower plume rise values may, depending on local meteorology and the system, contribute to the potential of induced fog. Other areas of concern to environmental effects of evaporative cooling systems such as icing, particulate suspension, and interaction with other atmospheric contaminants were also discussed. (Author abstract modified)

13027 APTIC NO. 30589

Benarie, M.

INVESTIGATION OF THE SYNOPTIC FORECASTING OF POLLUTION BY A STRONG ACID IN THE ROUEN REGION. *(Essai de prevision synoptique de la pollution par l acidite forte dans la region Rouennaise). Text in French. Atmos. Environ., 5(5):313-326, May 1971. 18 refs.*

Two synoptic criteria are defined for the prediction of high sulfur dioxide concentrations in the Rouen region of France: a period of 24 hours during which the mean wind velocity is less than 3.0 m/sec, and a forecast of a similar situation for the next day. At the present time, the proposed method, which uses only information contained in the daily forecast of the Meteorological Office, is the only practical method. The mathematical diffusion models and the empirical diffusion formulas need numerical weather data, which are not available for the next day. Thus, they cannot be effectively used in a particular forecast; they can only be verified in retrospect. The proposed empirical method allows pollution forecasting in calm periods. The mathematical diffusion models and empirical correlation formulas have singularities when the wind velocity approaches zero, and, therefore, cannot be used for calms. The r.m.s. error of the present method is less than that of mathematical models, even when calculated for days of the highest pollution in the winter. The principle of the proposed forecasting method is valid for other towns and regions, but the numerical data given only apply to the Rouen region. (Author abstract modified)

13028 APTIC NO. 30349

Blifford, Irving H., Jr.

TROPOSPHERIC AEROSOLS. *J. Geophys. Res., 75(15):3099-3103, May 20, 1970. 6 refs.*

The size and number distributions of atmospheric aerosols at altitudes ranging from the surface to 9.1 km were measured by using aircraft. A jet impactor was employed and data were obtained from direct microscopic counting techniques in the laboratory. Flights were made over a period of fourteen months at a location 250 km west of Santa Barbara, California, and at Death Valley, California. Additional samples were collected in the central Pacific Ocean near Palmyra and at Barbados in the Atlantic. Highly variable individual size distributions were indicated that on the average show a consistent trend toward uniformity with increasing altitude. At the lower altitudes over the oceans, the typical sea salt distribution is found. At altitudes over a few kilometers, it gradually becomes similar to the distribution over the midcontinental United States. Over the Pacific, a pronounced minimum is observed in particle concentration at about 3 km, which is probably due to a strong inversion that appears to restrict the upward transport of the maritime aerosol. Extremely high particle concentrations were found at Barbados at altitudes up to about 6 km, and the results seem to be consistent with previous reports of large amounts of Sahara dust at this location. (Author abstract)

13029 APTIC NO. 30332

Chandra, S. and P. Stubbe

ION AND NEUTRAL COMPOSITION CHANGES IN THE THERMOSPHERIC REGION DURING MAGNETIC STORMS. *Planetary Space Sci., 19(5):491-502, 1971. 25 refs.*

The structural differences of the ion and the neutral composition in the thermospheric region were studied by solving a system of basic ionospheric and atmospheric equations. The study showed that the compositional changes during a magnetic storm arise largely as a result of changes in the neutral composition at the turbopause. A decrease in (0)/(N2) in the lower atmosphere triggers a complex chain of events which results in an increase of the neutral gas temperature, depletion of the 0(+) layer, and enhancement of NO(+). The relative changes in these layers occasionally produce a sequence of electron density profiles giving rise to the so-called G condition. Compared to the neutral atmosphere, the ionosphere is much more sensitive to changes in (0)/(NR) in the lower thermospheric region. Since the ionospheric parameters can be measured much more accurately than atmospheric parameters, they should form an integral part of the observational data required to construct atmospheric models. (Author abstract)

13030 APTIC NO. 30732

Collis, Ronald T. H., William Viezee, Edward E. Uthe, and John Oblanas

VISIBILITY MEASUREMENT FOR AIRCRAFT LANDING OPERATIONS. FINAL REPORT. *Stanford Research Inst., Menlo, Park, Calif., Contract F19628-70-C-0083, Proj. 6670, Task 667004, AFCRL-70-0598, 140p., Sept. 30, 1970. 14 refs.*

NTIS, DDC: AD 716483

An experimental pulsed neodymium lidar system was modified and calibrated to obtain accurate data on atmospheric extinction properties in fog and low cloud conditions, in order to establish the theoretical and practical basis of a system for measuring slant visibility conditions for aircraft landing operations. Field tests were carried out at a temporary site at Half Moon Bay, Calif., and at the National Bureau of Standards site at Arcata, Calif. in May/June and August 1970, respectively. At Arcata, data were collected in conjunction with measurements by an array of up to five AN/GMQ-10 transmissometers. Observations were made in clear weather and in conditions of fog and low cloud using arrays of passive targets to provide information on atmospheric extinction. The correlation between atmospheric transmittance derived from lidar/target data and from AN/GMQ-10 transmissometers equalled that found between the data from individual transmissometers. Single-ended lidar data were obtained along horizontal paths adjacent to the passive targets and to a 500-ft base line transmissometer; atmospheric transmittances were computed from these lidar data using analytical methods of evaluating atmospheric extinction coefficients from a consideration of the slope of the lidar trace. Using values of extinction coefficient for atmospheric layers above the surface derived from series of lidar observations at different angles of elevation, examples are given of the calculation of transmittance over the line-of-sight path from which a pilot would look from the critical height to the surface to acquire visual reference. The potential use of lidar for revealing the general conditions of cloud and fog conditions in the airfield approach are described. (Author abstract modified)

13031 APTIC NO. 30850

Davis, R. J., R. E. Adams, and J. S. Gill

REMOVAL OF SOLID AEROSOL PARTICLES (AEC ACTIVITY 04 60 80 01 1). *In: ORNL Nuclear Safety Research and Development Program Bimonthly Report for May-June 1970. Oak Ridge National Lab., Tenn. AEC Contract W-7405-eng.-26, Sept. 1970. p. 55-61. 8 refs.*

NTIS: ORNL-TM-3061

Equations are presented for calculating the mass concentration of aerosol particles (or smoke) vs. time resulting from particle generation, coagulation, and settling. The equations postulate a steady-state size distribution function and assume that a normalized number concentration distribution and the corresponding normalized volume fraction distribution pertain between sharply defined maximum and minimum particle volumes (Vmax and Vmin). Experiments, based on transport of stainless steel oxide particles in tubes of various lengths and diameters, were undertaken to determine if the equations accurately describe aerosols of highly agglomerated oxide smokes (of the type expected in nuclear reactor accidents) and to evaluate Vmax and Vmin as functions of environmental parameters and time. Twenty-seven sets of particle size distribution data, corresponding to a variety of aerosol ages (0.4-3200 sec), Reynolds numbers (50-5600) initial concentrations (5 times 0.001 to 5 times 0.00001 g/cu cm) and humidities (wet and dry) were obtained and interpreted. Preliminary correlations indicate that age is most important. As the aerosol ages, Vmin becomes larger approximately according to Vmin equals Ct, where C is approximately 10 to the minus seventh power cu micron/sec, and Vmax becomes smaller approximately according to Vmax equals C/t, where C is approximately 100,000 cu micron-sec.

13032 APTIC NO. 30434

Fish, Birney R. and Jack L. Durham

DIFFUSION COEFFICIENT OF SO2 IN AIR. *Preprint, Oak Ridge National Lab., Tenn. and Air Pollution Control Office, Research Triangle Park, N. C., Div. of Chemistry and Physics, 10p., 1971 (?). 22 refs.*

A simple dynamic method was employed to determine the diffusivity of dilute sulfur dioxide in the air at concentrations near 3.8 mg cu m (1.5 ppm). Temperature dependence in the range 0 to 50 C was chosen by comparison of theoretical models with experimental data for sulfur dioxide diffusing in carbon dioxide. For 760 torr and the standard reference temperatures of 0, 20, and 37 C (body temperature), the diffusion coefficient of sulfur dioxide in dry air was estimated to be 0.117, 0.132, and 0.146 sq cm/sec, respectively. (Author summary modified)

13033 APTIC NO. 30354

Flemming, G. and H. Lux

MAPPLING AND EVALUATION OF THE SO2 IMMISSIONS IN THE COTTBUS DISTRICT FOR THE YEARS 1967 AND 1975. *(Kartierung und Bewertung der SO2-Immissionen im Bezirk Cottbus fuer die Jahre 1967 und 1975). Text in German. Z. Ges. Hyg. Grenzg. (Berlin), 17(2):107- 112, 1971. 6 refs.*

Distribution cards of long-term sulfur dioxide concentrations were calculated for the district of Cottbus. Included in the calculations are the frequency of 16 wind directions and the average speed for each direction. The higher turbulence of winds from northwest to northeast is also taken into account. Actual stack height is calculated according to Stuemke s formula. First, individual emission fields in polar coordinates (distance, direction) are calculated for each emission source. For calculations of the total emission field, rectangular coordinates with a grid size of 4 km are used; the coordinates are selected according to the Gauss-Krueger grid. The results for 1967 show that emission maxima are found in three areas with 0.12 mg SO2/cu m, 0.08 mg/cu m, and 0.07 mg/cu m. Predictions for 1975 indicate a deterioration of the emission situation, with the maximum above 0.15 mg/cu m.

13034 APTIC NO. 30338

Flohn, Hermann

CAN WE PRODUCE OUR OWN CLIMATE? (Produzieren wir unser eignes Klima)? Text in German. Meteorol. Rdsch., 23(6):161-164, Nov. /Dec. 1970. 18 refs.

Numerical estimates of all large-scale artificial sources and sinks of energy -- loss caused by atmospheric pollution, gain produced by fossil-fuel combustion -- show that man-made effects on climate can no longer be considered negligible. There has been a longer period of inadvertent climate modification caused by the activities of an increasing world population, mainly by destruction of vegetation in arid and semi-arid climates. One of the most urgent tasks of climatology is forecasting the effect of environmental changes. The task can be approached with numerical simulation models. (Author abstract modified)

13035 APTIC NO. 30411

Fukuoka, Sabuto, Mitsuru Udagawa, Sekio Izumikawa, Masanao Funashima, and Koyo Iwasaki

ON RELATIONSHIP BETWEEN SULFUROUS ACID GAS DENSITY BY ALTITUDE AND METEOROLOGICAL CONDITIONS AS OBSERVED AT TOKYO TOWER - 2ND REPORT. *(Tokyo tawa ni okeru kodobetsu aryusangasu nodo to kisho joken tono kankei ni tsuite - dai 3-ho). Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Ann. Rept. Tokyo Met. Res. Inst. Environ. Prot.), vol. 2:28-33, March 1971. 2 refs.*

Continuous measurements are reported of wind direction and velocity at 25 m, 107 m and 253 m; of temperature at 4 m, 64 m, 103 m, 169 m 221 m, and 250 m; and of sulfur dioxide at 25 m, 125 m, and 225 m. Data were obtained during March 1969 through February 1970. Based on monthly averages of SO2, the 125 m height had the highest annual average (10.2 pphm), and also a higher value for March through August; each of these months was higher than 10 pphm. The annual average at 25 m was 8.3 altitude 7.9 at 225 m. The highest value is recorded for August at all three altitudes. The occurrence of high SO2 concentrations is tabulated according to altitude and broken down into six classes -- below 10 pphm, 10-20, 20-30, 30-40, 40-50 and over 50. A concentration over 50 pphm occurred more frequently at 125 m and 225 m than at 25 m. Hourly variations in concentration during each season were examined. The variation curve shows a two-peak pattern at 25 m, a single-peak or ambiguous two-peak pattern for 125 m and a 3-peak in summer, two-peak in spring and winter and single-peak type for fall. At 225 m. The SO2 concentration altitude was related to wind direction and velocity. It appears the source SO2 pollution must be different for the respective altitudes -- high chimneys in Kawasaki and Yokohama could be sources of pollution at 225 m and 125 m while the pollution at 25 m is caused by sources located immediately around the Tower. The morning peak was earlier for lower altitude. A south or south southwest wind results in higher pollution at 225 m and 125 m while east and west southwest winds are responsible at 25 m. Because an SO2 concentration of more than 0.5 ppm is frequently recorded at 225 m and 125 m, high-density SO2 may be passing above the Tokyo Tower.

13036 APTIC NO. 30712

Gilbert, Traugott

REPORT ON LECTURE GROUP C OF THE CONGRESS REINHALTUNG DER LUFT 1969. *Staub (English translation from German of: Staub, Reinhaltung Luft), 30(2):12-18, Feb. 1970. 25 refs.*

NTIS: TT 70-50047/12

A new mathematical model is described that permits emissions in industrial complexes to be calculated as functions of time and location. With this method, a certain period of time is divided into a number of equal intervals. For each interval, a stationary field of ground-level concentration is computed from the model for a very large number of grid points within the industrial complex after determining a complete set of initial parameters (emission records and meteorological parameters). If the frequency of occurrence of meteorological conditions is known, the frequency distribution of the concentration can be calculated for each grid point. The parameters of the frequency distribution can then be shown on maps and used for the definition of the emission base load. A new method for determining chimney height is also based on average meteorological dispersion conditions. At constant chimney emission parameters, the necessary chimney height is a function only of the mean wind velocity at the considered site. Methods are also presented for correcting chimney heights in accordance with topographic conditions. Practical applications of dissipation calculations are noted as are British regulations on chimney height.

13037 APTIC NO. 30872

Gorbis, Z. R. and F. Ye. Spokoynyy

SOME PATTERNS OF THE PULSATING MOTION OF SOLID PARTICLE IN TURBULENT FLOW. *(Nekotoryye zakonomernosti pul satsionnogo dvizheniya tverdoy chastitsy v turbulentnom potoke). Izv. Akad. Nauk SSSR, Mekh. Zhidk. Gaza, no. 1:137-141, 1969. 11 refs. Translated from Russian. National Aeronautics and Space Administration, Washington, D. C., 9p., July 1970.*

NTIS: N70-32796

A mathematical analysis is presented of the patterns of the transverse pulsations of a spherical particle in turbulent flow. On the basis of the patterns discerned, estimates are derived of the effect of a number of factors on the intensity of pulsations in the velocity of the solid component in continuous dispersion flows. (Author abstract modified)

13038 APTIC NO. 30200

Hariharan, T. A.

ATMOSPHERIC TURBIDITY FROM POLARIZATION OF OUTGOING VISIBLE RADIATION. *Pure Appl. Geophys. (Milan), 86(3):198-204, 1971. 9 refs.*

From a comparison between high altitude measurements of the polarization of visible radiation over various natural surfaces with those computed for molecular and turbid atmospheres, some estimates of the aerosol parameters such as the exponent of the power law distribution and the limiting radii for the particles obtained are presented. The measurements were made from a high altitude jet aircraft flown over clear ocean, farmland, desert sand, and uniform cloud decks. Tables for the molecular atmosphere take into consideration multiple scattering and surface reflection while the tables for the turbid atmosphere take into account multiple scattering by molecules and primary scattering by aerosols. A comparison of the measured polarization with those computed for a molecular atmosphere give a first indication of the extent of atmospheric turbidity. (Author summary modified)

13039 APTIC NO. 30727

Herzog, Henry W., Jr.

THE AIR DIFFUSION MODEL AS AN URBAN PLANNING TOOL. *Socio-Econ. Plan. Sci., vol. 3:329-349, 1969. 21 refs.*

An air diffusion model for a metropolitan area is constructed and used to evaluate the property value and planning theories of zoning. Each is examined with the aid of linear mapping developed between emitter and receptor space and unit diffusion coefficients. According to the property value theory, the value of each piece of property should be maximized without causing a corresponding decrease in the value of other property. Zoning is required only when a nuisance arises. Zoning regulations are shown to fall out of the equilibrium condition implied by the theory. The planning theory attempts to formulate a comprehensive plan that meets the needs of the total urban environment, its people, and its resources. Both the city planner and the economist would lean heavily toward a zoning concept based on this theory.

13040 APTIC NO. 30472

Hilst, Glenn R.

METEOROLOGICAL MANAGEMENT OF AIR POLLUTION. *In: Air Pollution Arthur C. Stern (ed.), Vol. 1, 2nd ed., New York, Academic Press, 1968, Chapt. 10, p. 321-347. 6 refs.*

The high degree of variability of the transport and dilution capacity of the atmosphere, from place to place and time to time, is well recognized. Taken in conjunction with variable pollutant materials, source distributions and strengths, and with the large variety of inanimate and animate objects which these materials affect in varying degrees, these atmospheric variables define the air pollution system. Two approaches to mathematical models are available: previous histories of air pollution sources, meteorological measurements, and ambient air quality may be used to construct statistical models of the air pollution system; alternately, an understanding of the processes of atmospheric transport and diffusion coupled with knowledge of the time and space distributions of sources of pollutants permits synthesis of a physical model of this system. Both types of models are discussed, as well as air pollution control criteria and management strategy for the proper utilization of meteorological information. Given a valid understanding of the atmospheric dispersion processes in a given locality, a second responsibility of the dispersion meteorologist is to evaluate the consequences of alternative locations of the sources of air pollutants. Source configuration design and land usage are discussed, as well as the control of single and multiple sources. The role of the meteorologist in air pollution management is considered.

13041 APTIC NO. 30595

Hinds, W. T.

DIFFUSION OVER COASTAL MOUNTAINS OF SOUTHERN CALIFORNIA. *Atmos. Environ., 4(2):107-124, March 2, 1970. 16 refs.*

A series of tests were conducted to examine diffusion from continuous point sources in relatively mountainous terrain. The source was a zinc sulfide generator operated for 15-30 min with an effective source height of two to six meters. A description of the large number of data available is given. Estimates of vertical diffusion from centerline exposures, crosswind standard deviations, and conventional representations of vertical plume growth are not accurate in the mountainous terrain. A comparison of diffusion over mountainous terrain and flat terrain in the same climate showed that daytime (unstable) conditions minimized the importance of terrain, while nighttime (stable) conditions led to significant interactions between terrain and synoptic scale weather events. Diffusion over a system of ridges and canyons usually results in lower exposures on the canyon floor than would occur at the same distance over flat terrain. (Author abstract modified)

13042 APTIC NO. 30596

Horvath, H.

ON THE BROWN COLOUR OF ATMOSPHERIC HAZE. *Atmos. Environ., 5(5):333-344, May 1971. 9 refs.*

The roles played by nitrogen dioxide and aerosol in the brown color of atmospheric haze are discussed. If an aerosol has no light absorption, a layer extending at least a distance twice as long as the visibility will appear white, because the wavelength dependent light extinction is compensated by additional scattering from the sun. Only if the aerosol contains absorbing materials, such as NO2, will the horizon have a yellow or brown color. If a bright object is seen through the haze, the wavelength dependent extinction is partly compensated by additional light scattering from the sun. Thus, the observed light is only slightly different from the original sunlight; the object will be considered white. Only if the objects are very bright will they be considered yellow. If the aerosol has an additional light absorption due to the presence of NO2, all bright objects will be considered yellow. The wavelength dependent scattering is the main reason for color changes at night, because no compensation due to additionally scattered light occurs. It is concluded that the brown haze is due to the presence of NO2, despite its smaller extinction coefficient. (Author conclusions modified)

13043 APTIC NO. 30847

Hoven, Isaac Van der (ed.)

ATMOSPHERIC TRANSPORT AND DIFFUSION IN THE PLANETARY BOUNDARY LAYER. *Environmental Science Service Administration, Silver Spring, Md., Air Resources Labs. ESSA-TM-ERLTM-ARL-20, 65p., June 1970. 13 refs.*

NTIS: ERL-TM-ARL-20

A study has been undertaken of atmospheric transport and diffusion in the planetary boundary layer, micrometeorology, diffusion climatology, and the application of this work to the disposal of radioactive waste gases into the atmosphere. The Lagrangian Eulerian scale ratios derived from tetroon (balloon) flights past a tower at the Nevada Test Site have been criticized on the basis of tetroon response to vertical air motion. However, useful information concerning urban influences on the air flow can be obtained from tetroon flights. Nighttime tetroon flights at heights of 100-200 m have indicated ascending air motion upwind and descending air motion downwind of the city in relatively unstable atmospheres, but no appreciable vertical air motion in stable atmospheres. Pressure data have been used to derive wind data. Air quality and meteorological data have been obtained for Los Angeles with tetroons, radar, and an instrumental helicopter. A new concept and methodology for predicting a meteorological variable by statistical techniques has been developed. Mixing length hypotheses are discussed, while urban wind measurements have been made on a tall tower in New York City. Some mesoscale transport results are presented. Accuracy testing of random-to-grid interpolation of mesoscale winds was undertaken, as well as kinematic modeling of mesoscale flow. Efficient map types, forecast verification, turbulent wind velocity components from hot wire arrays, an environmental chamber, hemispheric dispersion, and diffusion and deposition studies have been considered.

13044 APTIC NO. 30736

Huff, F. A., R. C. Beebe, D. M. A. Jones, G. M. Morgan, Jr., and R. G. Semonin

PRELIMINARY REPORT EFFECT OF COOLING TOWER EFFLUENTS ON ATMOSPHERIC CONDITIONS IN NORTHEASTERN ILLINOIS. *Illinois State Water Survey, Urbana, Circ.-100, 37p., 1971. 59 refs.*

A literature search revealed a discouraging lack of information on how effluents from large cooling towers, such as those which would be required at Zion, affect atmospheric conditions in their vicinity. More attention was given to fog and icing associated with plumes from evaporative cooling towers than to any other weather effects. The majority opinion appears to be that fog and icing are minor problems. Quantitative data on the effects of cooling tower plumes on clouds and precipitation were extremely meager. Occasional observations of light drizzle or snow attributed to tower effluents were reported. Most of the information relating to meteorological effects associated with cooling tower effluents concerned the natural-draft type employing evaporative cooling. To date, no large dry cooling towers have been constructed in the United States. Studies specific to the Zion complex included the relative magnitude of heat-moisture output from the towers, tower effluent-lake breeze interaction, and cloud modeling. The interaction between tower effluents and the atmosphere is very complex and dependent upon local conditions of climate and topography. Consequently estimates of the environmental effects must be recognized as speculative.

13045 APTIC NO. 30214

Huffman, P. J. and T. Ohtake

FORMATION AND GROWTH OF ICE FOG PARTICLES AT FAIRBANKS, ALASKA. *J. Geophys. Res., 76(3):657-665, Jan. 20, 1971. 15 refs.*

A mechanism is proposed for the formation of ice fog particles in the city and environs of Fairbanks, Alaska. Equations are developed for calculating the size distribution resulting from growth by deposition of water vapor. The equations are numerically solved with a computer for three major types of ice fog sources: automobile exhaust, exhaust from heating plants, and open water. The size distribution produced by an individual source is determined by the cooling rate of water vapor injected into the environment. The cooling rate is a function of the source characteristics and the ambient temperature. The proposed mechanism adequately represents the observed size distribution if the cooling rate of the water vapor injected into the environment is not too large. Because of the large cooling rate of the water vapor injected into the atmosphere by automobile exhausts, the size distribution from this source is not adequately represented by the model. In agreement with observations, the computational results predict a decrease in the size of ice fog particles with decreasing ambient temperature for exhaust from heating plants and open water. (Author abstract)

13046 APTIC NO. 30319

Hunt, B. G.

CLUSTER IONS AND NITRIC OXIDE IN THE D-REGION. *J. Atmospheric Terrest. Phys., 33(6):929-942, 1971. 21 refs.*

A somewhat speculative reaction scheme is advanced to account for the existence of H30(+) and H502(+) ions in the mesosphere. The precursor for these ions is shown to be NO(+) rather than 02(+), on the basis of the reaction H + (NO(+).H20) yields H30(+) + NO. The rapid decline in the observed H30(+) and H502(+) ion concentrations above 80 km is attributed to the reaction of atomic oxygen with constituents in the reaction chain. The use of the observed nitric oxide distribution in the mesosphere results in excessively high electron concentrations, unless it is assumed that NO(+) cluster ions with very high dissociative recombination rates are formed. Fairly good agreement between the calculated ion and electron densities and observation is obtained, but a substantial amount of laboratory work is required to verify the proposed reaction scheme. (Author abstract)

13047 APTIC NO. 30699

Israel, Hans, M. Horbert, and C. de La Riva

THE EDDY TRANSFER OF ACTIVE AND PASSIVE CONTAMINANTS IN THE ATMOSPHERIC BOUNDARY LAYER. (FINAL TECHNICAL REPORT). *Rheinisch-Westfaelischen Technischen Hochschule, Aachen (West Germany), Forschungsstelle fuer Geophysik und Meteorologie Army Contract DAJA37-69-C-1348, Proj. 2M061102B538, Rept. E-1263, 207p., Nov. 1970. 16 refs.*

NTIS,DDC: AD 716359

Atmospheric eddy transport was studied. Theoretical studies were made of the digital-electronic mode of evaluation for thoron profiles, taking account of additional atmospheric convective mass transport; the solution of the eddy mass transfer equation; computer programs to evaluate the original parameters from measured profiles; an analog computer technique for evaluating eddy mass transfer data; sampling density and resolving power; the pulse function; the boundary, the mathematical equations; turbulence; and probability. Then radioactive tracers were measured by an ionization chamber to determine mass transport; an atmospheric thoron profile was used to determine eddy diffusity. Eddy viscosity and eddy conductivity were determined from wind and temperature profiles, respectively. Comparison of these three parameters of atmospheric turbulence structure was made under varying meteorological conditions near Aachen. Also, eddy diffusivity was measured in a forest. An analog computer was used to simulate and evaluate the eddy mass transfer equation. Data is given for daily variation (hourly means) of the eddy diffusivity, the exhalation, and the wind velocity. Measurements were also taken of the thoron concentration, wind direction, temperature, and humidity.

13048 APTIC NO. 30861

Johnson, Gary M.

RESEARCHES ON THE PROPAGATION AND DECAY OF VORTEX RINGS. *Aerospace Research Labs., Wright Patterson AFB, Ohio, Energetics Research Lab., Proj. 7116, ARL-70-0093, 43p., June 1970. 28 refs.*

NTIS, DDC: AD 713705

The propagation of vortex rings in air was studied via stroboscopic photography and hot-wire anemometry. Measurements were made of vortex time of flight, axial velocity distribution, and geometry. Then empirical formulas were developed and compared with the existing theories. The linear momentum of vortex rings was conserved, and the ratio of vortex ring radius to core radius was approximately constant. Vortex rings will transport aerosols over large distances, and are important in cloud and buoyant plume formation. In order to obtain data on the vortex ring geometry, a mist of dioctyl phthalate particles with .6 micron mean diameters was used.

13049 APTIC NO. 30845

Johnston, Harold S., J. N. Pitts, Jr., James Lewis, Leo Zafonte, and Tom Mottershead

ATMOSPHERIC CHEMISTRY AND PHYSICS TASK FORCE ASSESSMENT. *California Univ., Berkeley, Dept. of Chemistry and California Univ., Riverside, Dept. of Chemistry, Grant AP-00104, 97p., Sept. 1, 1970. 261 refs.*

The chemical source of photochemical air pollution is the interaction of nitrogen oxides, sunlight, oxygen, and hydrocarbons. The current state of knowledge on the complex role of nitrogen oxides is assessed, as well as the roles that singlet oxygen molecules and minute traces of chlorine may play in smog formation. Particulates may contribute to atmospheric chemical reactions as light absorbers, condensed phase catalyst sites, or sinks for active species. A simple relationship permitting estimation of the collision rate between gas molecules and aerosols from the range of visibility is presented. Information pertinent to the chemistry of photochemical air pollution comes from three sources: analyses of the atmosphere as a function of time and space; laboratory smog chambers; and kinetic and photochemical laboratories. From known rate constants, the molecular and free radical concentrations in the inorganic atmospheric system can be calculated. From these calculations, a substantial list of active species has been found. An analysis is presented which shows many of the aspects of photochemical smog. In view of the great variety of active inorganic species and the greater variety of organic substances with which they react, it appears unlikely that smog can be completely eliminated by selective removal of the more reactive hydrocarbons instead of the blanket removal of all hydrocarbons. (Author summary modified)

13050 APTIC NO. 30344

Kaji, Hideki

STATISTICAL MODEL FOR ESTIMATION OF AIR POLLUTION. *(Taiki osendo suitei no tameno tokeiteki moderu). Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot., vol. 2:331-337, March 1971.*

A statistical model is proposed as a means of comprehensively and systematically estimating the overall air pollution in a given area. Assuming that the metropolitan Tokyo area (23 wards) is divided into a number of 500 m meshes and the total quantity of sulfur dioxide gas discharged from all large chimneys located in the i mesh area is to be estimated, the following assumptions must be made. The total quantity of the SO2 emitted is proportional to the total heavy oil consumption by all the factories in the i mesh of the other wards. Heavy oil consumption in a factory is proportional to theproduction scale of that factory, as indexed by the number of workers employed. A formula for the total quantity of SO2 in the i section is elaborated and formulae for other mesh areas developed from the basic formula are given and discussed. This method differs from the conventional method of estimation based on the diffusion equation, and is an effective mathematical model for estimating the actual situation. It is applicable to a highly concentrated SO2 distribution windward of the pollutant source, which cannot be dealt with by the diffusion formula. Further development of the new theory is expected.

13051 APTIC NO. 30419

Lamb, Robert G. and Morris Neiburger

AN INTERIM VERSION OF A GENERALIZED URBAN AIR POLLUTION MODEL. *Atmos. Environ., 5(4):239-264, April 1971. 16 refs.*

The diffusion equation is used to derive a mathematical model for computing the concentrations of atmospheric pollutants resulting from specified arbitrary distributions and intensities of point, finite line, and finite area sources, using horizontal winds variables in space and time, and allowing for variation of atmospheric stability, absorption at the ground, chemical reactions, upper level inversions, and variable diffusion coefficients. The model is tested with respect to its diffusion characteristics (ignoring chemical reactions) by computing the carbon monoxide concentrations for each hour on a particular day at 760 locations in the Los Angeles Basin. The computed values at the locations of monitoring stations agree reasonably well with observations. A more advanced version of the diffusion model is being developed. (Author abstract)

13052 APTIC NO. 30444

Low, Richard D. H.

A MORE RIGOROUS EXPRESSION FOR THE RATE OF DROPLET GROWTH. *Atmospheric Sciences Lab., White Sands Missile Range, N. Mex., 13p., 1970. 15 refs.*

NTIS, DDC: AD 713559

Weather modification includes the dissipation of a warm fog or the improvement of visibility within it by seeding with condensation nuclei. Mathematical equations are discussed which describe droplet growth. An expression for condensational growth of a liquid solution droplet was formulated which considered hygroscopicity of a nucleus. The equations considered the vapor pressure-lowering property of an electrolytic nucleus, vapor pressure as a function of temperature, thermal conductivity, surface tension, radius, and density. The growth expression was applied to lithium chloride, sodium chloride, ammonium nitrate, and ammonium sulfate at 1% supersaturation, and a comparison between the growth determined from the new expression and from earlier formulas was made for sodium chloride.

13053 APTIC NO. 30631

Ludwig, F. L. and E. Robinson

OBSERVATIONS OF AEROSOLS AND DROPLETS IN CALIFORNIA STRATUS II. *Tellus, 23(2):164-175, 1971. 21 refs.*

Size distributions of aerosols and droplets were observed in stratus in the hills south of San Francisco during the summers of 1968 and 1969. Instrumentation included a Royco light-scattering particle counter, a condensation nuclei counter, and a settling tunnel. The average size distributions showed primary modes at submicron sizes on clear days, during cloud formation and dissipation, and in the developed cloud. A broad secondary mode of about three droplets/cu cm micron was found at a radius of five micron in the cloud. A somewhat sharper mode of 0.91 cu cm micron occurred at eight micron radius in the average size distribution for dissipating clouds. During periods of cloud onset, the secondary mode was not well developed. Time-section analyses of particle and droplet spectra are given, and these show that there is a considerable temporal variability in the spectra. The time-section analyses fail to confirm the general trend of the droplet mode toward larger sizes with time, as predicted by some numerical calculations of condensation processes. Analyses of the chloride, sulfur compound, and nitrate content of the aerosols and droplets are presented. The amounts of sulfur compounds and nitrates relative to chlorides are too high for the principal source of these materials to have been sea salt, unless the chlorides had been lost through some chemical process. (Author abstract)

13054 APTIC NO. 30838

Manz, Joe E.

A LADAR CLOUD/TARGET POLARIZATION DISCRIMINATION TECHNIQUE. *Air Force Weapons Lab., Kirtland AFB, N. Mex., Proj. 5791, Task 028, TR-AFWL-TR-70-76, 182p., Oct. 1970. 64 refs.*

NTIS, DDC: AD 717707

The use of laser detection and ranging (lidar) systems in the atmosphere is limited by the severe attenuation of the signal due to absorption by atmospheric gases and/or scattering by fog and cloud particles. Furthermore, the cloud and fog particles may scatter the transmitted radiation toward the receiver, thus producing a false return, which must be distinguished from the true target return. An optical polarization technique for discriminating between a cloud return and a target return is described. Also presented are the results of a research program which demonstrated the validity of the discrimination technique both in the laboratory and in the field. The discrimination technique is based on the theory that if a linearly polarized laser beam propagating through an atmospheric cloud or fog is incident on a diffuse surface, then, according to Mie theory, the radiation scattered from the cloud is either linearly or elliptically polarized while the radiation reflected from the surface is depolarized. If the transmitter output of a ladar system is linearly polarized and an analyzer with its plane of polarization perpendicular to that of the transmitted wave is placed at the input of the receiver (which is adjacent to the transmitter), then the cloud return will be up to 94% less than the value obtained when the analyzer's plane of polarization is parallel to the transmitted signal. The target return remains unchanged. (Author abstract)

13055 APTIC NO. 30718

Matsunaga, F. M., K. Watanabe, and W. Pong

STUDY OF SCATTERING AND FLUORESCENCE OF GASES IN THE VACUUM ULTRAVIOLET. (FINAL REPORT). *Hawaii Univ., Honolulu, Dept. of Physics and Astronomy, Contract AF19(628)-4967, Proj. 8627, Task 862701, Rept. AFCRL-70-0615, Work unit 86270101, DOD Element 61102F, DOD Subelement 681310, 99p., Oct. 30, 1970. 119 refs.*

NTIS, DDC: AD 717771

Measurements of spectral absorption and photoionization cross sections of carbon dioxide, ammonia, oxygen, carbonyl sulfide, nitric oxide, nitrogen, and vinyl chloride in the region 580-1650 A were made. A number of new Rydberg series were found and the convergence limits were compared with the photoionization values. In the study of dispersed fluorescence from molecules, particular attention was given to the emissions from carbon monoxide, NH3, N2, and NO in the spectral region 1800-6000 A. The experimental Franck-Condon factors for CO and N2 were found to be in good agreement with the theoretical values. On the basis of the observed threshold of the NH emission, the calculated energy separation of the a(1) delta state from the ground state of NH is 2.2 plus or minus 0.1 eV, which is somewhat higher than the value previously reported. The excitation spectra of No show many overlapping states. However, the B prime to lead to X transitions of NO were identified, and the experimental Franck-Condon factors are in agreement with the calculated values. The results suggest that the gamma prime band contribution in NO emission is negligible. Excitation spectra of other molecules such as hydrogen, oxygen, and sulfur dioxide were studied, and certain features of the emission spectra can be related to the spectral absorption. The effect of molecular collisions on the fluorescence of NO was investigated. Quenching of the B prime D, E, and F states with the enhancement of the gamma band emission was observed. (Author abstract)

13056 APTIC NO. 30158

McBoyle, G. R.

METEOROLOGICAL ASPECTS OF AIR POLLUTION. *Can. J. Public Health (Toronto), 62(2):133-138, March/April 1971. 23 refs.*

The relationship between pollution concentrations and air turbulence, temperature gradients, and inversions is analyzed. In addition, classifications, formulae, and research models of pollution dispersion and accumulation are evaluated as to their effectiveness in predicting pollution from single and point sources. It is emphasized that natural and man-made topographical factors must also be considered when studying pollution distributions and that local pollution should always be considered within the framework of regional pollution patterns.

13057 APTIC NO. 30819

Meyers, Ronald F.

KINEMATICS OF DIFFUSION, FLUIDS AND PLASMA BY CONTINUOUS MOVEMENT AND FINITE VELOCITIES. *Preprint, Deseret Test Center, Fort Douglas, Utah, 15p., 1970. 24 refs.*

NTIS, DDC: AD 713588

Hyperbolic diffusion equations, based on Dirac-delta functions, were derived to describe the kinematics of diffusion, fluids, and plasma by continuous movement and finite velocities. The equations cover the motion of any number of particles in the finite-state space. They should be useful in solving such complicated problems as the kinematics of turbulence flows, meterological dynamics, and plasma interactions. In certain atmospheric diffusion applications, they may be more pertinent than parabolic differential equations.

13058 APTIC NO. 30692

Nakajima, Chotaro

METEOROLOGICAL STUDY OF AIR POLLUTION (BROAD-SCALE FORECASTING). *(Taiki osen no kishogakuteki kenkyu (koikiyoho). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):107, 1970. (Proceedings of The Japan Society of Air Pollution, Annual Meeting, 11th, Tokyo, Japan, 1970.)*

Broad-scale, long-term weather and pollution forecasting is necessary to effectively prevent pollution. An extremely early prediction may not be possible, but a forewarning by at least several days of weather susceptible to heavy smog is desirable. The weather and smog patterns of each industrial area are different; for instance, long waves of air circulation passing near Japan seem to be closely connected with the pollution and atmospheric stability of Kyoto during winter. A long-term prediction is different from a short-term one in which a pollutant is assumed to diffuse endlessly into the atmosphere. The purpose of broad-scale forecasting must take in the possibilities of the appearance of pollutants at the least expected geographic areas. A prediction covering about a month requires a definition of types of dispersion according to the weather and types and volumes of daily pollutants. In a study of atmospheric circulation, pollutants serve as tracers; further studies must be made concerning their roles in energy-balance and absorption, reflection, and diffusion of various radiation by pollutants.

13059 APTIC NO. 30691

Nakano, Michio and Jiro Narikawa

FORECASTING OF HEAVY SMOG IN OSAKA. *(Konodo taiki osen no yoho). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):106, 1970. (Proceedings of The Japan Society of Air Pollution, Annual Meeting, 11th, Tokyo, Japan, 1970.)*

Smog warnings are issued in Osaka at present after heavy pollution becomes apparent and nothing effective can be done toward its solution. Studies were conducted as to the accuracy of early forecasting as well as the characteristics of smog in Osaka in order to permit anti-smog measures. According to the past two-year records of forecasts made on the day before, accurate results were obtained generally in fair weather when: migratory high pressure covered the air and high pressure stayed behind and the low pressure approached from the Kyushu area. Predictions were often inaccurate when: the protrusion of high pressure was weak; Osaka was in the trough of pressures; or when the cold front was approaching. Accurate results can be obtained by the forecast made on the same day on all items except the last. The prevailing two types of smog are: a heavy smog in the morning and evening, caused by weak pressure inclination and by the land and sea breeze in the Osaka Plane; and day-time or morning smog caused by rain or gradient winds growing strong during the previous night.

13060 APTIC NO. 30253

Novitskiy, B. F.

ON THE USE OF OPTICAL QUANTUM GENERATORS IN THE STUDY OF ATMOSPHERIC DIFFUSION PROCESSES. *(Primeneniye opticheskikh kvantovykh generatorov v issledovanii protsessov atmosfernoy diffuzii). Text in Russian. Tr. Gl. Geofiz. Observ. (Leningrad), no.238:64-69, 1969. 6 refs.*

The design of a laser locator, described in the literature and suitable for detection of temperature inversion and localization of aerosol clouds in the atmosphere is discussed. Another use of the laser in the study of aerosols, namely in their photographing in laser light (hollography), is considered. The basic conditions for obtaining good characteristic hollograms of aerosols were studied. A home-built impulse hollograph with a ruby crystal is described which is suitable for study of the capture mechanism of atmospheric admixtures by aqueous aerosols. Selection of longitudinal modes from higher order modes in the laser is accomplished by a resonant reflector. The choice of a light reflector determines the spatial and energetical character of aerosol illumination. Duralium was the best material for the reflector, as it gave uniform illumination of the ruby surface and effective heat removal. The advantages of the hollographic method in the study of aerosols are enumerated.

13061 APTIC NO. 30795

Palmen, Erik

AIR POLLUTION A LOCAL, NOT A GLOBAL PROBLEM. *(Luftfororeningen lokalt men inte globalt problem). Text in Swedish. Forum Ekon. Tek., no.10:16-18, 1971.*

More temperate statements of the environmental problem are advocated. While it is necessary to continue the war on pollution in industralized areas caused by industrial wastes and automobile exhaust, statements to the effect that the climate of the entire planet is being affected are not based solidly on scientific facts. Such an overemphasis could be dangerous, since the public, once it discovers that an overstatement has been made, may react by becoming apathetic to the real dangers at the local level. Data is presented on three critical problems: the hothouse effect cuased by an increase in carbon dioxide, the effect of dust accumulation in the stratosphere, and sulfur dioxide fallout. Although it is true that the CO2 content of the atmosphere is increasing due to the extensive use of fossil fuels, the effect is somewhat offset by the fact that plant life and the oceans tend to absorb some of this excess. Even if the CO content would increase at the present rate, by the year 2000 the increase would only amount to 15-20% which would affect the overall atmospheric temperature by only a fraction of a degree. Meanwhile, it is likely that alternate sources of energy will be found to replace the consumption of carbon fuels. Although dust as a local public health problem is not to be minimized, the upper atmosphere is armed with sufficient defense mechanisms to meet the assault of dust and to purify itself on a global basis. This is evidenced by its ability to survive a major volcanic eruption. Studies made of this phenomenon indicate that the large quantities of dust raise the temperature of the stratosphere, but that the troposphere temperature shows a corresponding decline, which eventually brings the atmosphere back to its former equilibrium.

13062 APTIC NO. 30820

Pankratov, A. V. and S. Ya. Pzheshetskiy

CERTAIN LAWS OF PHOTOCHEMICAL DECOMPOSITION OF OZONE IN THE LIQUID PHASE. *(Nekotoryye zakonomernosti fotokhimicheskogo razlozheniya ozone v zhidkoy faze). Zh. Fiz. Khim., 32(7):1605- 1611, 1958. 12 refs. Translated from Russian. Scientific Translation Service, La Canada, Calif. 12p., 1958.*
NTIS: N67-10231

The photochemical decomposition of ozone in the liquid phase was investigated at -183 C. For comparison, measurements were also made of the reaction in the gaseous phase. AT -183 C, the quantum yield in the liquid phase attained a value of 25; in the gaseous phase at room temperature, it was about 3.5. The value of the yield shows that the photochemical decomposition of ozone in the liquid phase proceeds according to a chain mechanism with the participation of excited oxygen molecules. The difference in the quantum yield values in the liquid and gaseous phases is due to the fact that liquid phase conditions are more favorable for the transfer of energy from the excited oxygen to the ozone molecules. (Author abstract modified)

13063 APTIC NO. 30441

Panofsky, Hans

ANALYZING ATMOSPHERIC BEHAVIOR. *Phys. Today, 23(12):32-35, Dec. 1970. 5 refs.*

The application of hydrodynamics and thermodynamics to atmospheric problems such as weather forecasting and explaining global circulations is discussed. Meteorological equations relating basic atmospheric variables are introduced. All weather forecasting is now done by application of the equations to large-scale systems, with 24-48 hr forecasts in the middle latitude the most satisfactory. Attempts are now being made to extend the period of satisfactory forecasts to a week or longer. The meteorological equations explain global circulations rather well, but the effect on climate and circulation of pollution-induced changes in composition has not been studied and is of the highest priority. Air pollution can be treated as a mesoscale phenomenon by applying the conservation equation, or integrated over volumes, for a particular pollutant. Accuracy of the estimates is limited mostly by errors in specifying the wind, which must be known on the mesoscale, and local variations caused by obstacles. As a rule, uncertainty in the meteorological effects is not an important limitation in air pollution control.

13064 *APTIC NO. 30676*

Patterson, Clair C.

LEAD IN THE ENVIRONMENT. Conn. Med., 35(6):347-352, June 1971. 9 refs.

The uses of lead throughout history, beginning in 2500 BC, are discussed. Industrial lead enters the oceans via rivers and by atmospheric washout. Pollution from the atmosphere has increased abruptly during the last two decades as a result of a sudden growth in the burning of leaded automobile gasolines. The concentration of lead in the atmosphere varies according to how close one comes to the sources, which are the cities. Ventilation within cities is determined by horizontal air currents beneath inversion layer ceilings. These ceilings are elevated in the summer and lowered in the winter, so that urban atmospheric lead concentrations are higher in the winter. Most of the lead emitted as automobile exhaust consists of small, long-lived aerosols, but a portion is made up of large particles that fall out along roadsides. Soil lead concentrations decrease by more than a factor of ten within 400 m of the road. Similar decreases are observed in grasses and foliage. These facts are important in considering the effects on children in schools located near freeways and on crops grown near highways. It is concluded that the body burdens of lead in typical urban dwellers are several orders of magnitude above natural levels. Such severe, chronic exposure to lead probably has deleterious effects.

13065 APTIC NO. 30437

Peterson, K. R. and T. V. Crawford

PRECIPITATION SCAVENGING IN A LARGE-CLOUD DIFFUSION CODE. *Preprint, 14p., July 28, 1970. 12 refs. (Presented at the Precipitation Scavenging Meeting, Richland, Washington, June 2-4, 1970.)*

NTIS: UCRL-72603

The precipitation scavenging option included in the Lawrence Radiation Laboratory s large-cloud diffusion model was checked against the only nuclear cratering event in which precipitation occurred in coincidence with extensive airborne and surface sampling of radioactivity. This specific cratering test involved snowout downwind. Pre-detonation predictions and later diagnostic calculations, using observed meteorological information, are compared with radioactivity measurements made after the Cabriolet detonation. (Author summary modified)

13066 APTIC NO. 30777

Raynor, Gilbert S., Janet V. Hayes, and Eugene C. Ogden

EXPERIMENTAL DATA ON DISPERSION AND DEPOSITION OF TIMOTHY AND CORN POLLEN FORM KNOWN SOURCES. *Brookhaven National Lab., Upton, N. Y., NAPCA Research Grant AP-81, BNL 50266 (T-595), Meteorology- TID-4500, 32p., Oct. 1970. 10 refs.*

Dispersion and deposition of timothy and corn pollen released naturally from circular area sources of cultivated plants and artificially from point sources were measured. Concentrations were measured by wind-impaction samplers on 20 deg radii at four heights and at four or five distances from the sources. Deposition was measured from greased microscope slides on the ground. Field, laboratory, and analysis procedures are described, and original and derived data were presented. Dispersion data include centerline and crosswind integrated concentrations, plume widths and heights, and mass flux at each sampling distance. Deposition data include centerline and crosswind integrated deposition, magnitude of deposition, and deposition velocity. A comparison between deposition and loss in mass flux was also presented. (Author abstract modified)

13067 APTIC NO. 30852

Ripperton, Lyman A. and James J. B. Worth

CHEMICAL AND ENVIRONMENTAL FACTORS AFFECTING OZONE CONCENTRATION IN THE LOWER TROPOSPHERE. *North Carolina Univ., Chapel Hill, Dept. of Environmental Sciences and Engineering and Research Triangle Inst., Research Triangle Park, N. C., Engineering and Environmental Sciences Div., NSF Grant GA-1022, NCU Grant ALU-1 (440), Army Contract DA-HC19-67-C0029, ESE Pub-234, 57p., Aug. 1969. 21 refs.*

NTIS: N71-13125

The fourth year of a routine atmospheric measurement program has been completed. Field studies were made in the Southern Appalachian Mountains and in the North Atlantic Ocean off North Carolina. A study was also made on Pike s Peak, the results of which have pertinence for the study of ozone behavior in the boundary layer of the atmosphere. Simultaneous measurement of O3 at several elevations above the ground offers a good means of determining vertical motion of the atmosphere. Ozone concentrations frequently increased ahead of a cold front, indicating deep vertical mixing. Gas phase reactions resulting in the destruction of O3 occur and are an important O3 sink. Other important O3 sinks are the reactions between O3 and nitrogen dioxide and O3 and nitric oxide. The diurnal variations in O3 concentrations on mountain tops are almost completely out of phase with such variations in valleys and flat lands. Presumably, this is a function of whether the air on the peak is mixed with air from below (daytime) or whether there is a down draft due to surface cooling (nighttime). Ozone is synthesized in the troposphere and this may occur in photochemical systems. The behavior of O3 in the lower troposphere is dependent on physical and chemical factors and is strongly influenced by the underlying surface. (Author abstract modified)

13068 APTIC NO. 30863

Robinson, Elmer

EFFECT ON THE PHYSICAL PROPERTIES OF THE ATMOSPHERE. *In: Air Pollution. Arthur C. Stern (ed.), Vol. 1, 2nd ed., New York, Academic Press, 1968, Chapt. 11, p. 349-400. 47 refs.*

The presence of air pollutants can affect the observed properties of the atmosphere in a number of different ways, but the deterioration of visibility is probably the first indication of air pollution of which a citizen becomes aware. Urban air pollutants also significantly alter the concentrations of condensation nuclei, as shown by the pattern of atmospheric electricity measurements over wide areas far removed from urban centers. The effects of air pollution on visibility are considered, including observational problems and meteorological factors, and inversion height, wind speed, hygroscopic particles, humidity, and air quality standards are noted. Mathematical concepts of visibility are cited. Rayleigh scattering, Mie scattering, absorption factors, and color effects due to atmospheric nitrogen dioxide concentrations are included. Visibility can be calculated from the extinction coefficient. If the assumption is made that the particulate material in the atmosphere is of uniform size and that scattering alone accounts for the extinction, then the concentration of particulate material coinciding with a given visibility can be determined. To calculate the opacity of a typical metallurgical fume from light scattering data, it is necessary to calculate the number of particles in each size interval per unit of gas volume. Plume opacity calculations for open burning, calculation of plume opacity control limits, and smoke plume absorption measurements using laser techniques are also described. Effects of air pollution on fog, clouds, precipitation, and urban radiation conditions are reviewed. Urban turbidity applications and visibility observations for urban air pollution studies are considered. Possible changes in atmospheric concentrations of carbon dioxide, lead aerosols, fine particle concentrations, and trace gas concentrations of sulfur dioxide and carbon monoxide are also discussed.

13069 APTIC NO. 30842

Robinson, N.

THE EFFECT OF THE ATMOSPHERE ON SOLAR RADIATION REACHING THE EARTH. *In: Solar Radiation. New York, Elsevier, 1966, Chapt. 3, p. 47-110. 106 refs.*

The energy from solar radiation reaching the Earth s surface is substantially modified by scattering and absorption in the atmosphere. The path length varies according to the sun s position. The air mass of a homogeneous atmosphere, transmissivity, intensity of solar radiation, optical air mass, the actual air mass, and zenith angle can be calculated mathematically. The scattering coefficient can also be determined for any wavelength and can be used to determine the amount of energy scattered per unit path length. The distribution of energy emerging from the top of the atmosphere and the skylight is discussed. When the scattering particles are small in comparison with the wavelength, the Rayleigh scattering theory can be applied. The Mie theory, related to scattering theory can be applied. The Mie theory, related to scattering in dense aerosols, is also discussed. Surface albedo also effects the transmitted and reflected energy. The luminance of the sky which is due to scattering depends on the position of the sun and the coordinates of the particular point on the celestial sphere. Spectra due to electronic transitions of oxygen, nitrogen, and ozone lie chiefly in the ultraviolet region, while those due to the vibration and rotation of polyatomic molecules such as water, carbon dioxide, and ozone lie in the infrared. Atmospheric absorption coefficients are also discussed. The absorption of solar ultraviolet radiation is closely associated with photochemical reactions which lead to the formation of ionized layers (ionospheric and ozone layers). Ozone content varies with seasons and latitude. Transmittance in the infrared bands can be estimated. Absorption curves are given for water vapor; they can be used to calculate the absorption of solar radiation. Also, absorption of solar radiation at various altitudes, latitudinal and vertical distributions of heating, and temperature changes are discussed. When pollution or turbidity associated with particulates increases, the depletion of solar radiation also increases. Thus, measurements of solar radiation can be used to determine turbidity.

13070 APTIC NO. 30843

Robinson, N.

THE ENERGY DISTRIBUTION IN THE SPECTRUM OF DIRECT AND SCATTERED RADIATION REACHING THE EARTH. *In: Solar Radiation. New York, Elsevier, 1966, Chapt. 5, p. 161-195. 29 refs.*

The energy distribution in the solar spectrum is discussed. Ultraviolet, infrared, and visible radiation are effected by various factors including the air mass, scattering, wavelength, turbidity, and humidity. Spectral curves are given for direct solar radiation (I-radiation) and scattered sky radiation (D-radiation). Various mathematical theories can be used to determine the energy distributions and water drop distributions. Radiation intensity varies in different spectral regions and for different values of turbidity. The energy distribution of combined solar and sky radiation (G-radiation) is also described. The ultraviolet region is quite important because of biological effects. The wavelength is dependent on seasons and distance above sea level. Ultraviolet radiation is charted by diurnal variation during the year. For a cloudless sky, D-radiation in the 2800-3150 A range was more intense than the I-radiation. In winter, the latter factor increased by six during the day while the former increased by a factor of 14. In the summer, the corresponding values are 60 and 22. Ultraviolet radiation is also more strongly effected by cloudiness than the radiation in the other spectral regions. Visible radiation is also discussed.

13071 APTIC NO. 30591

Rodliffe, R. S. and A. J. Fraser

MEASUREMENTS ON THE RELEASE OF GASEOUS ACTIVITY FROM A SHORT STACK. *Atmos. Environ., 5(4):193-208, April 1971. 4 refs.*

The behavior of the gaseous effluent released from a short stack at a nuclear power station was examined using argon-41 as a tracer. The rate of release of activity from the stack was determined and the resulting ground level gamma fluxes were measured and correlated with wind speed and direction. The results are identified with two types of plume behavior, characterized by the ability of the effluent to penetrate the shear and wake region over the building. If the effluent does penetrate this region, an elevated plume is formed, unaffected by surrounding buildings. Otherwise, the effluent is entrained in the low pressure field above and in the lee of the building where rapid mixing occurs and a large area of the building appears to emit the plume. At low wind speeds the observed gamma fluxes were found to be independent of wind speed, while at high wind speeds the fluxes showed an inverse dependence on wind speed. The results were compared with a model which assumes a gaussian distribution of wind speeds and a switch from the elevated plume to entrainment at a critical wind speed. Good agreement was obtained. Values of the ratio of efflux velocity to critical wind speed were dependent on direction and were in the range of 1.5-3.0. (Author abstract modified)

13072 APTIC NO. 30834

Rosen, James M.

SIMULTANEOUS MEASUREMENT OF ATMOSPHERIC DUST BY LASER AND BALLOON SOUNDING TECHNIQUES. (PROGRESS REPORT). *Wyoming Univ., Laramie, Dept. of Physics, NASA Grant NGR 51-001-019, 91p., July 1970.*

NTIS: N71-10042

The relation between the aerosol concentration and optical properties of the atmosphere was studied in a series of four simultaneous laser back scatter and dust soundings from Wallops Island, Virginia. A small compact aerosol sounding device primarily for balloon-borne measurement was developed. The initial research was concerned with obtaining two successful aerosol soundings during the time laser back scatter measurements were being made. Complete tabulated data were presented for dust concentration, altitude, atmospheric pressure, size distribution, temperature, humidity, wind direction and velocity, and ozone pressure. During the time of the aerosol sounding, an aircraft was flying in the area searching for clear air turbulence. No significant turbulence was encountered. The relationship of clear air turbulence to the aerosol concentration therefore, could not be determined. The photometer method of measuring the dust concentration rather than a particle counting method to result in a light weight package was investigated. An effort was also made to reduce the size and weight of the particle counter type aerosol detector. General agreement between the two types of soundings indicates that the scattering profile is similar to the profile for submicron dust particles. These results imply that particles smaller than 0.1 micron diameter do not play a dominant role in the optical properties of the atmosphere.

13073 APTIC NO. 30207

Ross, Fraser

SULPHUR DIOXIDE OVER BRITAIN AND BEYOND. *New Scientist Sci. J., 50(751):373-374, 376-377, May 13, 1971.*

Despite some increase in emissions, ground-level concentrations of sulfur dioxide have decreased about 40% in Great Britain since 1952. This is partly due to the fact that all chimneys for large installations are designed so that the gases rise clear of the chimney top and go on rising with their thermal buoyancy. The required final height depends on their sulfur content. Dispersion then proceeds and the resulting ground-level concentrations are below nuisance values. These chimneys have been accused of being the source of the increased acidity of the rain over Sweden. However, of each ton of sulfur emitted by a high chimney, no more than a third of a kilogram could fall on an area of a thousand sq km. Thus, if SO2 concentrations can be kept locally within nondamaging limits, it is far from obvious that dilution is not a solution. The problems are those of keeping peak concentrations within cities within tolerable limits and of controlling emissions in some heavily industrialized valley sites where air exchange is poor and where chimneys high enough to cause the gases to escape at all times are near or above the practical limit. To avoid dangerous urban peaks, some strict limits must be placed on the sulfur content of fuels used in appliances emitting exhaust gases at low levels. Low-sulfur fuel oils, or a dry flue gas desulfurization process that might be combined with pyrite removal from coal would solve the second problem.

13074 APTIC NO. 30771

Rouzaud, Bertrand

STUDY OF ATMOSPHERIC DIFFUSION WITH THE AID OF A RADIOACTIVE INDICATOR GAS. *(Etude de la diffusion atmospherique a l aide d un indicateur radioactif gazeux). Text in French. Toulouse Univ., France, Centre de Physique Atomique et Nucleaire, Thesis (Ph.D.), June 12, 1970, 86p. 60 refs.*

NTIS: NP-18349

The diffusion of a gaseous radioactive indicator, ejected from a point source, is studied. The indicator is the Rn-220 obtained artificially with a source of Thoron-228 (120 mCi). The measurement installation for Thoron and the vertical sections experimentally obtained are plotted. An interpretation is made with a numeric model giving the resolution of the diffusion equation. (Author abstract modified)

13075 APTIC NO. 30657

Schon, J. P. and P. Mery

A PRELIMINARY STUDY OF THE SIMULATION OF NEUTRAL ATMOSPHERIC BOUNDARY LAYER USING AIR INJECTION IN A WIND TUNNEL. *Atmos. Environ., 5(5):299-311, May 1971. 18 refs.*

The injection of air upstream of a boundary layer presents an interesting method for the thickening of this layer and therefore of simulating the atmospheric surface layer. A wind tunnel with a 1.20 by 1.00 sq m cross section, of the open circuit type, was employed. A settling chamber, with grids and a contraction, the ratio of which was 16 was at the channel intake. The test plate (10 m long) designed of stratified polyester could be heated by hot air circulation, while the moveable ceiling, also of the same material, made it possible to cancel the pressure gradient. Turbulence intensity at the channel center was 0.3%, and in the last measurement section, the flow was verified as two-dimensional. Air injection took place at the beginning of the channel through a porous plate, the duct loss of which was large enough to produce a good distribution of the injected air. After a certain distance (9.20 m), the boundary layer was noticed to recover, at least in the inner zone, the characteristics of a natural turbulent layer. The comparison of the spectra of these layers with the atmospheric ones is encouraging in spite of the lack of test plate roughness.

13076 APTIC NO. 30321

Scott, R. K.

THE EFFECT OF WEATHER ON THE CONCENTRATION OF POLLEN WITHIN SUGAR- BEET SEED CROPS. *Ann. Appl. Biol. (London), 66(1):119-127, 1970. 7 refs.*

Automatic volumetric spore traps were used during 1965-67 to sample the air from mid-June to mid-August in diploid open-pollinated sugar-beet seed crops. The pollen concentration increased between 05.00 and 09.00 (Greenwich Modian Time) as relative humidity became less than 90%, was greatest between 09.00 and 11.00, when relative humidity was about 75%, and gradually decreased toward evening. The average 24 hr pollen concentration ranged from 170 to 12,400/cu m, being greatest on fine, windy, dry days after periods of cooler weather. Rain in the morning washed pollen out of the air and damaged developing anthers, but rain in the late afternoon following a sunny morning had little effect on pollen catch. Rain at night sometimes caused an immediate temporary increase in pollen concentration. Most pollen was released between June 27 and July 31 in all years, more in the first than in the second half of July. Cool and damp conditions prevailed in 1965; 1967 was warm and dry, 1966 warm and dry early, and cool and wet late. The total pollen catch in 1965 and 1966 was 83% and 31%, respectively, of that in 1967. However, the percentage germination of seed harvested in the three years was similar. The total pollen catch on a trap 230 m east of the 1965 crop was about 1% of the catch within the crop on days with gusty westerly winds. The catch on a trap about 46 cm above the 1966 crop averaged 78.6% of that at the level of most flowers. (Author abstract modified)

13077 APTIC NO. 30459

Semonin, Richard G.

OBSERVATIONS OF GIANT CHLORIDE PARTICLES IN THE MIDWEST. *J. Rech. Atmospheriques, 2(3):251-260, 1966. 10 refs.*

An investigation of the spatial and temporal variations of the chloride particulate content of the atmosphere over Illinois does not suggest a very strong relationship to precipitation processes occurring in the area or to prevailing air mass type. Local sources of giant chloride nuclei were found in Peoria, but an examination of long-term rainfall patterns revealed no anomalies attributable to their influence. The greatest concentration of chloride particles was observed south of the Chicago area (1000/cu m), decreasing northeastward near the lakeshore of midtown Chicago (400/cu m). Sixty-five km south of Chicago, the chloride content dropped to nearly zero, illustrating the lack of chloride particles in the air mass. Horizontal profiles of chloride concentrations extending from Illinois to the Gulf of Mexico are described.

13078 APTIC NO. 30753

Shifrin, K. S. and I. L. Zel manovich

TABLES OF LIGHT SCATTERING. VOL. II. TABLES OF SCATTERING MATRICES AND STRAY FIELD COMPONENTS. *(Tablitsy po svetorasseyaniyu, tom II. Tablitsy matrits rasseyaniya i sostavlyayushchikh rasseyannogo polya.) Leningrad, Hydrometeorological Press, 1968, p. 3-12, 14 refs. Translated from Russian. Crerar (John) Library, Chicago, Ill. National Translations Center, 22p., 1970 (?).*

Four-valued quantities of the scattering matrix and stray field components are presented for the scattering of visible and infrared radiation by water droplets. The results of computations using precise formulas for the diffraction of plane electromagnetic waves in the atmosphere are presented tabularly. The tables differ from previous ones in that they contain: a study of scattering on absorbent particles; computation of all matrix components; values for the stray field components; computation of forward and back-scattering at very small angles; scattering in the region of the primary rainbow; and a detailed network of dimensions for the particles and the scattering angles. (Author abstract modified)

13079 APTIC NO. 30245

Shikata, Hiroshi

SOME CONSIDERATION ON THE PREDICTION OF ATMOSPHERIC POLLUTION. *(Taiki osen yosoku ni kansuru kosatsu). Text in Japanese. Central Research Inst. of Electric Power Industry, Technical Lab., 21p., Oct. 1970.*

It is a good policy for thermal power stations to use proper fuel oils, predict the future ground level sulfur dioxide concentrations, and determine the influence of stack gases on the concentration. Then, a system for the prediction and control of atmospheric pollution can be developed. The prediction process can be divided into three parts: the prediction of meteorological conditions governing stack gas diffusion; an estimate of the distribution of sulfur dioxide concentration by a specific source; and, an estimate of the distribution of SO2 concentration by a number of sources in an industrial area. Some suggestions are made on ways to make a continuous field survey and on how to use the data obtained from such a study. (Author abstract modified)

13080 APTIC NO. 30180

Soejima, Umio

OBSERVATION ON ATMOSPHERIC DIFFUSION PHENOMENA OF AUTOMOTIVE EXHAUST GAS IN THE VICINITY OF THE ROAD. *(Jidosha haikigasu no doro shuhen ni okeru kakusan gensho no kansoku to kosatsu). Text in Japanese. Jidosha Gijutsu (Automobile Eng.), 25(3):237-248, March 1971. 3 refs.*

The behavior of automobile exhaust gas at different stages of its diffusion into the air was studied. The relationship between traffic volume and carbon monoxide density along the roadside, the leeward diffusion from the roadside, the effects of buildings or structures located along the road, and the diffusion in an urban district were also studied. Observations were made along a trunk line running through a suburban district and along a busy street in the heart of a suburban town. For measurements of CO density, air was sampled with 200 15 l vinyl bags intermittently. The traffic flow observed within a 100 m distance was photographed by a 16 mm camera at speeds of one exposure per second. Wind velocity, wind direction, and temperature were measured every five seconds at 1.5 m above ground level. From the data, traffic models such as running speed were established. The analysis was carried out by classifying auto traffic into standardized models by speed, estimating CO emission for each model, and also analyzing the stirring and mixing effects given by the auto traffic. Jet theory and experiments with a gas generator showed that the automotive exhaust gas ascends to two m with the atmosphere s turbulent current of one/sec and the wind s velocity, and then diffuses in the normal way.

13081 APTIC NO. 30630

Soo, S. L.

EFFECT OF SIMULTANEOUS DIFFUSION AND FALL-OUT FROM STACKS AND AIRCRAFT. *Atmos Environ., 5(5):283-290, May 1971. 7 refs.*

The density distributions of gaseous and particulate contaminants, taking into account the simultaneous effect of diffusion and fall-out from a source in a steady wind, are computed. The results are applicable to stack plumes, exhaust emissions from jet aircraft, and processes which result in the transient injection of contaminants into the atmosphere. The solutions given are exact for constant species diffusivities and for Sutton diffusivities if the diffusion-fall-out interacting parameter remains constant. The influence of ground reflectivity is also considered. Generalized dispersion charts are presented. (Author abstract modified)

13082 APTIC NO. 30869

Soo, S. L.

EFFECT OF SIMULTANEOUS DIFFUSION AND FALL-OUT FROM PLUMES OF STACKS AND JET ENGINES. *Preprint, Air Pollution Control Assoc., New York City, 14p., 1970. 7 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 63rd, St. Louis, Mo., June 14-18, 1970, Paper 70-81.)*

Distributions in densities of gases and particulates by simultaneous diffusion and fallout from a source in a steady wind, a moving source at a constant velocity, or transient injection of a contaminant were computed, leading to modified Sutton equations. Charts of ground level flux of these cases are presented. Applicable cases are plumes of smoke stacks, exhausts of jet engines, and transient injection of pollutants. These Sutton equations are important for air pollution predictions.

13083 APTIC NO. 30747

Sood, Sudesh K. and Meryl R. Jackson

SCAVENGING STUDY OF SNOW AND ICE CRYSTALS. *IIT Research Inst., Chicago, Ill., Technology Center, AEC Contract AT(11-1)-578, Proj. C6105, Proj. Agreement 32, Rept. IITRI-C6105-10, 24p., Jan. 15, 1970. 10 refs.*

NTIS: IITRI-C-6105-10

Scavenging efficiency of naturally precipitating snow and ice crystals for 0.563 micron latex singlets and doublets was studied with an aerosol generator. Using an electron microscope, the effect of crystal habit and size on scavenging efficiency was determined. The scavenging efficiency of ice crystals increases with decreasing crystal diameter, while crystal habit does not have any significant effect on scavenging efficiency of 0.563 micron latex particles. Scavenging efficiency for these latex particles is approximately a third of that found for one micron B. Subtilis spores. Charge measurements on snow and ice crystals were continued. (Author abstract modified)

13084 APTIC NO. 30750

Sood, Sudesh K.

SCAVENGING STUDY OF SNOW AND ICE CRYSTALS. *IIT Research Inst., Chicago, Ill., Technology Center, AEC Contract AT(11-1), Proj. C6105, Proj. Agreement 32, Rept. IITRI-C6105-12, 17p., Aug. 10, 1970. 11 refs.*

NTIS: IITRI-C-6105-12

There are probably four main processes which play an important role in the capture of submicron particles by growing cloud elements during the formation of precipitation. These are Brownian diffusion, eddy diffusion, direct condensation, and phoretic processes. Simulating as far as feasible natural conditions that prevail within a cloud where ice crystal growth is taking place, a study was undertaken to assess the role played by diffusion and thermophoresis as in-cloud scavenging mechanisms. The experimental equipment which was assembled and used successfully to grow ice crystals by water vapor condensation is described. A theoretical analysis of the capture of aerosol particles by growing ice crystals has been made. Reasonable agreement has been found to exist between theoretical predictions and the experimental data in the literature. (Author abstract modified)

13085 APTIC NO. 30669

Suzuki, Takeo, Toshiichi Okita, Noboru Yamate, Eiji Yokoyama, and Masao Watanabe

STUDIES ON FORMATION AND EFFECT OF HYDROCARBONS AND PHOTOCHEMICALLY REACTIVE SUBSTANCES. *(Tankasuiso oyobi kokagaku hanno busshitsu no seisei narabini sono eikyo ni kansuru kenkyu). Text in Japanese. Inst of Public Health, Tokyo (Japan) and National Inst. of Hygienic Sciences, Tokyo (Japan). 60p., March 1969.*

Three experiments were conducted concerning the photochemical reaction of hydrocarbons and nitrogen dioxide. In the first experiment, sunlight and 500 watt xenon light were applied to 1000 ppm each of five kinds of hydrocarbons, including 1-butane, 1,3-butadiene, ethylene, propane, and methane, and to a mixture of 300 ppm NO2 and these hydrocarbons. Propane and methane were not changed by photo-irradiation. Under co-existence with NO2 small amounts of carbon monoxide and formaldehyde were produced. However, 1-butane, 1,3-butadiene, and ethylene, which were decreased in concentration by photo-irradiation, were remarkably affected under co-existence with NO2; carbon monoxide, formaldehyde, and ethyl nitrate, were formed. In the second experiment, in which electron capturing gas chromatographic analysis was applied to the products by photo-irradiation to the gas mixture of seven hydrocarbons and NO2, alkyl nitrite was formed and oxidized to alkyl nitrate. The effect of photo irradiation on automobile exhaust gases was studied in the third experiment. The olefin series of hydrocarbons, and nitrogen oxides showed a photochemical reaction, and alkyl nitrate and bi-acetyl were produced. These substances are formed by photochemical reactions in ambient air. The analytical result of an ambient air sample and the effect of ozone on the respiratory capacity and histamine content in lung of guinea pigs were also discussed.

13086 APTIC NO. 30741

Thompson, William I., III

ATMOSPHERIC TRANSMISSION HANDBOOK: A SURVEY OF ELECTROMAGNETIC WAVE TRANSMISSION IN THE EARTH S ATMOSPHERE OVER THE FREQUENCY (WAVELENGTH) RANGE 3KHZ (100KM) 3,000 THZ (0.1 MICROMETER). *Dept. of Transportation, Cambridge, Mass., Transportation Systems Center, Rept. DOT-TSC-NASA-71-6, Work Unit 164-21-10-05-25, 300p. Feb. 1971. 501 refs.*

This handbook presents material on electromagnetic wave transmission in the Earth s atmosphere with emphasis on earth-to-space paths up to January 1970. Such information is useful in air pollution, astronomy, communications, earth resources, geodesy, meteorology, and navigation. Transmission fundamentals are reviewed, inlcuding Bouguer s law atd units for expressing transmission. Electromagnetic wave characteristics which are discussed include wave velocity, frequency, wavelength, polarization, space-time relationship, rays, wavefronts, spherical waves, the inverse-square law, field intensity, power density, and dispersion. Electromagnetic spectrum notation and frequency management are considered. A guide to atmospheric data, relevant to electromagnetic wave propagation problems, is included. Information retrieval is discussed. The tables of contents of several books and major articles on atmospheric transmission are listed. Refraction, absorption, and scattering information is presented.

13087 APTIC NO. 30172

Tsutae, Tsutomu

HYGIENIC STUDIES ON THE WEATHER IN KUMAMOTO DISTRICT. REPORT III. RELATION BETWEEN THE AIR POLLUTION AND WEATHER IN KUMAMOTO CITY, ARAO CITY, AND YATSUSHIRO CITY. *(Kumamoto chiho no kisho- eiseigakuteki kenkyu. Dai 3 ho. Kumamoto chiho no taikiosen to kisho tono kankei). Text in Japanese. Kumamoto Igakkai Zasshi (J. Kumamoto Med. Soc.), 44(12):1238-1247, Dec. 1970. 25 refs.*

The relation between the sulfur dioxide concentration in the air and weather and wind was observed in Kumamoto City, Arao City, and Yatsushiro City in Kumamoto Prefecture. In Kumamoto City, with a wind velocity of 1.6 m/sec, the SO2 concentration in the summer was lower than in the winter, and it generally remained under two pphm all day. In winter, two peaks of SO2 concentration of over four pphm were observed. On cloudy and rainy days, the SO2 concentration was under one pphm with a wind velocity of four m, and it remained steady all day. In Arao City, the SO2 measurement occurred to the southeast of the origin of the pollutan and the SO2 concentration was much higher than that of Kumamoto City. On fine days in winter, two peaks of the SO2 concentration of over 20 pphm were observed. The concentration was inversely proportional to wind velocity. On cloudy and rainy days, the concentration was low, especially when the wind velocity was around 10 m; it went down to one third of the concentration of fine days. In Yatsushiro City, the SO2 concentration was between that of Arao and Kumamoto cities, and was generally high on fine days. On rainy days with a wind velocity of over 1.5 m/sec, the concentration was almost two pphm or under, and did not change all day. On fine days in the winter, no peaks were observed. The common facts in the three cities were as follows: the SO2 concentration was higher on fine days, than cloudy days, and lowest on rainy days; SO2 was higher when wind velocity was lower, in Kumamoto City and Yatsushiro City, no relation was observed between the SO2 concentration and wind direction.

13088 APTIC NO. 30461

Viniegra, Gustavo

THE ATMOSPHERIC CONTAMINATION. *(La contaminacion atmosferica). Salud Publica Mexico, 8(4):601-607, July-Aug. 1966. Translated from Spanish.*

Air pollution is discussed in terms of physiographic conditions that prevent the proper diffusion of contaminants. In particular, physiographic phenomena are cited for the cases of cities located on broad plateaus, in a valley, in a closed basin, or lying along the coast and very close to mountain ranges. Topographical interactions in the later case serve to cause the periodic atmospheric inversions characterizing pollution in cities along the west coasts of North and South America. Along the U. S.-Mexico border, several twin cities exist that are suffering the impact of atmospheric pollution both locally produced and generated in other places. A recommendation is made to carry out a pilot study on the problems of atmospheric pollution both a Ciudad Juarez and El Paso, so that the technical bases of cooperation can be delineated and then coordinated by the Pan American Sanitary Office.

13089 APTIC NO. 30832

Vonnegut, Bernard, Duncan C. Blanchard, and Robert A. Cudney

STRUCTURE AND MODIFICATION OF CLOUDS AND FOGS. (ANNUAL SUMMARY REPORT.) State Univ. of New York, Albany, Research Foundation, OAR Contract F19628-68-C-0057, Proj. 7922, Task 792201, Rept. 2, 162p., Oct. 1969. 153 refs.

NTIS, DDC: AD 707507

A wide range of field and laboratory investigations is described including studies on ionospheric potential, clear air seeding, the generation of raindrop-size distributions, and air-water interactions. In field atmospheric electric experiments in the first kilometer of the atmosphere, the feasibility of direct measurement of ionospheric potential was demonstrated using a tethered balloon. A network of point discharge current meters is now in operation which can determine the changes in point discharge current at various locations as a function of time. Potential gradient measurements made in dust storms have been used as evidence for the convective theory of cloud electrification. Laboratory studies were made to investigate the inductive charge transfer during particle collisions, the conditions under which sparks are produced between clouds of charge particles, and the production of rain gushes after a lightning stroke. Two studies were carried out on ice nucleation by silver iodide. The first showed that the rate at which silver iodide goes into solution cannot explain the low efficiency of silver iodide to nucleate ice when embedded in water drops. The second showed that sublimation and freezing by contact are very potent freezing mechanisms. When clear air was seeded with dry ice, ice crystal clouds only formed in 3% of the experiments. Work on raindrop dynamics was performed in the giant vertical wind tunnel. Thousands of drops (about 4.5 mm in diameter) were freely suspended and a high speed camera was used to study wake interactions. Theoretical work was carried out on the interaction and growth of raindrops in the upper part of updrafts in thunderstorms. Although raindrop-size distributions have a number of peaks, it is not clear that there is any periodicity in the peaks. An experimental study showed that it might be possible to account for exponential drop-size distributions in heavy rain on the basis of raindrop breakup. A rain gauge was developed based on the collection of water in many fine capillaries. It can not only record rapid changes in rain intensity, but also it can be used to indicate raindrop size. A dropsonde was also developed to obtain a record of the drop-size distribution as rain falls through a cloud. A phenomenon energized point-discharge current meter was also designed which is simple, inexpensive, and reliable. Air-water interactions were also studied. The generation of cloud nuclei at the surface of the sea can occur at a high enough rate to replace nuclei lost by coagulation and precipitation. (Author abstract modified)

13090 APTIC NO. 30739

Wahi, Bhupinder Nath

THE MOBILITY AND COEFFICIENTS OF SLIP OF POLYSTYRENE LATEX PARTICLES. *Minnesota Univ., Minneapolis, Particle Technology Lab., Thesis (M.S.), June 1970, 88p., 22 refs.*

NTIS: C00-1248-22

The mobility of a particle is an important property. Experiments were conducted to investigate whether there are genuine discontinuities in the region where the mean free path of air is comparable to particle size, and to further investigate the unexplored region where the mean free path of air is of greater magnitude than the particle radius. Since they are spherical, polystyrene latex particles were utilized. Excellent agreement of the experimental results with the theoretical predictions of Fuchs and Stechkina and of Millikan for oil-drops, confirms the general law of the fall of a small spherical body through a gas as formulated by Millikan in 1923. Utilizing a visual counting technique based on the microscope, no discontinuities are indicated in the region where the radius of the particle is comparable with the mean free path of air molecules. The theory behind the deposition of particles to form bands is thoroughly supported by the photographs taken and by the distribution of particles along the rod. Techniques used in these experiments could be extended to measure particle size and charge distribution.

13091 APTIC NO. 30412

Yamazaki, Hiroshi, Masataka Hayafuku, Rinko Nagata, and Kinshi Nakano

ON METEOROLOGICAL OBSERVATION BY KITOON OVER DOWNTOWN TOKYO. *(Kaitsuun ni yoru toshinbu no kisho kansoku ni tsuite). Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), vol. 2:34-38, March 1971. 2 refs. 30425 Yokoyama, Nagayuki and Mitsuaki Ino DIFFUSION OF DUST AND HEAVY PARTICLES. (Baijin ya omoi ryushi no kakusan). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 6(2):82-88, March 1971. 4 refs.*

Taylor s theory of diffusion is expanded by taking the weight of airborne dust particles into consideration. Basic equations derived by Taylor are applicable to heavy particles by substituting turbulence velocity for the fluctuation velocity of particles. Relations between statistical quantities of particle and turbulence velocity are clarified. The inertia of the particles smooths the turbulence velocity, with a response function of a linear system, and to cut out the high-frequency fluctuation. The cut-out frequency decreases as the diffusion time increases, namely, relatively low frequencies are effective for turbulent fluctuation in long-range diffusion. Similarly, the cut-out frequency decreases as the particle weight increases. When there is a large difference in density between fluid and particle, as is the case with dusts in air, the inertia effect does not last long. Those minute tracers employed for the diffusion study in the atmosphere or sea behave according to atmospheric diffusion, hardly showing the effect of inertia. Those markers or tracers in wind or water tunnel experiments, however, may show the inertia effect. The diffusion width of particles is narrowed by the inertia effect when the diffusion takes place primarily at high frequencies, as in wind tunnels. Inertia has little effect when the low frequencies affect the diffusion, as in the atmosphere. The maximum dust concentration on the ground appears at a shorter distance because of the inertia, and the maximum value is increased.

13092 APTIC NO. 30752

Zel manovich, I. L. and K. S. Shifrin

TABLES OF LIGHT SCATTERING. VOL. III. COEFFICIENTS OF EXTINCTION, SCATTERING, AND RADIATION PRESSURE. *(Tablitsy po svetorasseyaniyu. Tom III. Koeffitsiyenty oslableniya, rasseyaniya i luchevogo davleniya). Leningrad, Hydrometeorological Press, 1968, p. 3-12. 22 refs. Translated from Russian. Crerar (John), Chicago, Ill., National Translations Center, 20p., 1970 (?).*

Tables containing four-figure values of the cross sections and coefficients of extinction, scattering and radiation pressure for spherical particles are presented. Calculations are based on specific formulas of the theory of scattering for spheres of arbitrary sizes. Section I pertains to transparent and absorbent spheres within a wide range of values of the diffraction parameter and the indices of refraction and absorption. The second section contains data for pure water droplets suspended in air and in third section contains data for an index of refraction less than unity. Accuracy of the tables is discussed and they are compared with tables given in other reports. (Author abstract)

BASIC SCIENCE AND TECHNOLOGY

13093 APTIC NO. 30426

Joint Team for the Study of Photochemical Reactions (Japan)

STUDY REPORT ON FORMATION AND EFFECTS OF HYDROCARBON AND PHOTOREACTIVE SUBSTANCE. *(Tankasuiso oyobi kokagaku hanno busshitsu no seisei narabini sono eikyo ni kansuru kenkyu hokoku). Text in Japanese. 36p., April 1970.*

The formation of ozone was studied by irradiating a mixture of diluted automobile exhaust gas, dilute hydrocarbon gas (10 ppm), and nitrogen dioxide (0.5-10 ppm), and then analyzing the irradiated mixture by the alkaloid potassium method. Hydrocarbon and nitrogen dioxide concentrations were found to decrease with increasing irradiation time, while ozone was not detected before irradiation increased. Thus, ozone formation appears to depend on the photoreaction between hydrocarbons and nitrogen dioxide. To determine the vital effects of ozone, guinea pig lungs were exposed in vitro to ozone. Ozone increased the surface tension (especially minimum tension) of lung fluid, but had no effect on dipalmitoyl lecithin, a lung surface action substance. In related experiments, the column condition of the Perkin-Elmer 880 gas chromatograph was established for measurements of hydrocarbons in air. Some measured values are compared with those reported for the U. S.

13094 APTIC NO. 30435

Ausloos, P. and R. E. Rebbert

REACTIONS OF FREE RADICALS WITH NO2. *Preprint, National Bureau of Standards, Washington, D. C., 5p., 1959 (?). 1 ref.*

The reactions of alkyl and alkoxy radicals with nitrogen dioxide were investigated by photolyzing nitroalkanes, alkylnitrates, and azo compounds in the presence of NO2, nitric oxide, and oxygen. Labeled N(15)0 and 02(18) were used to elucidate the reaction mechanisms. In all cases, the reaction R + NO2 yields RN02 (1) was the major process. The competing reaction R + NO2 yields RONO (2) occurred at a rate less than three times the rate of (1). The reaction R + NO2 yields RO + NO was of importance only when R equalled alkyl. (Author abstract modified)

13095 APTIC NO. 30703

Bener, Paul

MEASURED AND THEORETICAL VALUES OF THE SPECTRAL INTENSITY OF ULTRAVIOLET ZENITH RADIATION AND DIRECT SOLAR RADIATION AT 316, 1580 AND 2818 M A.S.L. (FINAL REPORT). *Physikalisch- Meteorologisches Observatorium Davos, Davos-Platz (Switzerland), AF Contract F 61052-67-C-0029, Proj. 7621-03, DOD Element 62405394, DOD Subelement, 68100, 269p., July 1970. 20 refs.*

NTIS, DDC: AD 716535

Measurements of zenith intensity of the clear sky and of direct solar intensity were taken for selected wavelengths at Biel, Davos, and at Weissfluhgipfel, Switzerland. A parallactically mounted spectrophotometer was employed. This instrument comprises a telescope furnished with achromatic quartz-fluorite lenses, double monochromator Zeiss model MM 12, and a Swiss type photomultiplier attached to the exit slit. Large deviations from theory amounted, on an average, to about 50% and showed partly irregular variations in dependence on solar altitude and wavelengths. They were found by comparing measured values of zenith intensity with the theoretical intensity for a Rayleigh atmosphere relating to the optical thickness for the wavelengths and elevations in question. A satisfactory agreement is, on the other hand, obtained, if measured and theoretical values of zenith intensity are examined in dependence on ~~the measured values of optical~~ thickness for extinction. (Author abstract modified)

13096 APTIC NO. 30347

Billingsley, J. and A. B. Callear

INVESTIGATION OF THE 2050 A SYSTEM OF THE NITRIC OXIDE DIMER. *Trans. Faraday Soc., 67(579):589-597, March 1971. 21 refs.*

The far ultraviolet continuum of nitric oxide was assigned to the dimer by obtaining the following experimental evidence: the intensity of the spectrum was proportional to (NO) to the second power; the possibility that the carrier may be some other known oxide of nitrogen was eliminated; from the temperature dependence the enthalpy change accompanying dissociation was 2.24 (plus or minus 0.1) kcal/mol (100-140 K), in good agreement with 2.4 (plus or minus 0.2) kcal/mol deduced from the dimer infrared intensities; approximate upper and lower limits to the dissociation constant and the temperature dependence were consistent with Guggenheim s method of analyzing the second virial coefficients by means of the principle of corresponding states. An absolute scale of dissociation constants was fixed from the excess of the reduced second virial coefficient at its normal boiling point, and the temperature dependence found spectroscopically. The dissociation energy of the dimer is 1.6 (plus or minus 0.1) kcal/mol. Evidence for substantial population of excited states of the dimer at 300 K was discussed. The dimer continuum exhibits a maximum at 2050 A, and the oscillator strength of the system was recorded as 0.26. (Author abstract)

13097 APTIC NO. 30778

Boffa, C. and E. Pfender

A NEW METHOD FOR THE GENERATION OF ULTRAFINE, MONODISPERSE AEROSOLS. *Minnesota Univ., Minneapolis, Heat Transfer Lab., APCO Grant AP 01161-01, 31p., Feb. 1971. 42 refs.*

Ablation studies were performed on a transpiration cooled anode of a high intensity arc utilized for the generation of ultrafine monodisperse aerosols. The plenum chamber surrounding the porous carbon anode is subdivided into several independent plenum chambers which allow for individual control of the pressure in each of these chambers. In this way, the inherent instability associated with transpiration cooling is circumvented. The parameters were determined which govern the size and size distribution of the ultrafine aerosol particles generated at the arc attachment area on the anode surface. Correlations between the arc current, the cooling gas flow rate transpiring through the ablating surface of the anode, and the aerosol size distribution were found for mean particle diameters as small as 50 A. (Author abstract modified)

13098 APTIC NO. 30626

Calo, Joseph M., Robert C. Axtmann, and Lonnie Crowder

COLLISIONAL DEACTIVATION OF CO2 AND CO LUMINESCENCE. *J. Chem. Phys., 54(12):5428-5429, June 15, 1971. 12 refs.*

An equation is given for determining the collisional deactivation of carbon dioxide and carbon monoxide luminescence. The large value obtained for CO2 indicates a large collisional quenching cross section, characteristic of ions. The CO2 luminescence is believed to arise from a neutral system or from neutral CO bands. The quenching cross section of the CO2 was calculated to by 95 sq A. The observed CO emission was probably from neutral CO bands. The quenching cross sections was 6.8 sq A.

13099 APTIC NO. 30628

Chenov, Yu G.

CONDUCTANCE OF MULTICOMPONENT GAS MIXTURES. *High Temp. (English translation from Russian of: Teplofiz. Vys. Temp.), 8(5):881-885, Sept.-Oct. 1970. 12 refs. 30767 Chiu, Grace and Frank T. Gucker COMPARISON OF THREE SERIES FOR CALCULATION OF LIGHT-SCATTERING FUNCTIONS. Preprint, Indiana Univ., Bloomington, Chemical Lab., 16p., 1969 (?). 2 refs.*

New series in sines and cosines of multiple angles (i.e., sin-cos and cos Nu Theta series) are shown to reproduce the classical Mie series for light scattering intensity functions to plus or minus three in the sixth significant figure. Both new series should prove advantageous for analytical studies. The computing speed, relative to the Mie series, decreases with alpha but increases with the number of angles. With computer programs, the sin-cos series is slower than the Mie series, but over a considerable useful range, the cos Nu Theta series is faster; e.g., for alpha less than 15, 55, and 90, at intervals of five, one and 0.5 deg, respectively.

13100 APTIC NO. 30720

Doerre, Werner H. and Klaus Wettig

SOME OBSERVATIONS ON TERMS OF THE HYGIENE OF THE AIR. *(Einige Betrachtungen zu lufthygienischen Begriffen). Text in German. Wiss. Z. Humboldt Univ. Berlin Math. Naturw. Reihe, 19(5):463-466, 1970.*

On the basis of a model oriented to the theory of systems, an attempt is made to define the exact meaning of some concepts current in air hygiene like optimal environmental conditions, pollution, stress and noxiousness. Thus, optimal environmental conditions imply a composition of atmospheric air which brings about an optimal development of the organism. All deviations from this composition are pollutants, irrespective of whether they are the result of human activity or not. All disturbances which move the system away from the optimal state are considered unfavorable, while those that move the system towards the optimal state are favorable. The measure of disturbances induced by environmental factors is a criterion of the stability of the system. Whatever detracts from the system s stability is considered a noxious influence. Optimal conditions for the development of a system are expressed mathematically.

13101 APTIC NO. 30877

Douglass, Irwin B. and Paul M. Cocanour

STUDIES OF ALIPHATIC SULFENYL AND SULFINYL CHLORIDES--1966-1968. *In: Mechanisms of Reactions of Sulfur Compounds. Vol. 3, Santa Monica, Calif., Intra-Science Research Foundation, 1968, p. 37-41. 20 refs.*

Studies of alkanesulfenyl chlorides and alkanesulfinyl chlorides conducted between 1966 and 1968 are summarized. Included in the first group of studies is work on free radical reactions of alkanes with sulfonyl chlorides and trichloromethanesulfenyl, on the nature of the adducts obtained from methane-or benzenesulfenyl chlorides and terminal olefins, on the addition of ethanesulfenyl chloride to 3,4-dihydro-2H-pyran, on the spontaneous decomposition of methanesulfenyl chloride and methylsulfur chloride, and on addition of alkanesulfenyl chloride to 1-hexane. Alkanesulfinyl chlorides are discussed with special reference to studies of the solvolysis of organic sulfur trichlorides and the hydrolysis of methanesulfinyl chloride.

13102 APTIC NO. 30822

Gluskoter, Harold J., Louis H. Pierard, and Hermann W. Pfefferkorn

APATITE PETRIFACTIONS IN PENNSYLVANIA SHALES OF ILLINOIS. *J. Sediment. Petrol., 1970:1363-1366, Dec. 1970. 13 refs.*

Phosphatic petrifactions of wood were collected from two separate localities in the Pennsylvanian shales of Illinois. Optical microscopy, x-ray diffraction, and chemical analyses show that the mineralization is primarily carbonate fluorapatite. One petrifaction was closely associated with nodules and irregular masses of similar fluorapatite composition. The early replacement of wood by carbonate fluorapatite indicates the ready formation of the fluorapatite under some diagenetic conditions and suggests that the origin of at least some of the nodules and irregular masses is not necessarily from coprolites other organic residues. (Author abstract modified)

13103 APTIC NO. 30725

Gupta, J. C., Y. H. Ma, and L. B. Sand

DIFFUSION OF SULFUR DIOXIDE IN SYNTHETIC AND NATURAL ZEOLITE CRYSTALS. *Preprint, American Institute of Chemical Engineers, New York, N. Y., 24p., 1971. 23 refs. (Presented at the American Institute of Chemical Engineers National Meeting, 68th, Symposium on Adsorption, Part. 1, Houston, Tex., 1971, Paper 16e.)*

The diffusion of sulfur dioxide in pure acicular crystals of synthetic mordenites and natural erionites was investigated in a constantsvolume variable-pressure unit. The diffusion of SO2 in the crystals was considered as one dimensional in the longitudinal and radial directions in mordenite and erionite, respectively. The rates of sorption in different crystal sizes were measured, and effects of initial gas pressure on the rates were investigated. The diffusion coefficient increased with increased crystal size. The values of D/a2, where a is a chracteristic length, remained essentially constant at each initial pressure. This is attributed to the fact that the diffusion process may be coupled with other processes such as slow sorption. The diffusion coefficients also increased with increased initial gas pressure. An extension of these studies will provide information on the mechanisms of differential processes in zeolites. (Author summary modified)

13104 APTIC NO. 30418

Horvath, Helmuth

ON THE APPLICABILITY OF THE KOSCHMIEDER VISIBILITY FORMULA. *Atmos. Environ., 5(3):177-184, March 1971. 5 refs.*

The inverse proportionality between the visibility and the extinction coefficient, first derived by Koschmieder, is only applicable under very limited conditions: the atmosphere must be illuminated homogeneously, the extinction coefficient and the scattering function are not allowed to vary with space, the object must be ideally black and be viewed against the horizon, and the eye of the observer must have a constant contrast threshold. A general formula, taking these facts in account has been derived and used to calculate possible errors which might inhomogeneous illumination generates errors smaller than five per cent. An inhomogeneous distribution only due to different dilutions of the aerosol gives no error if the average of the extinction coefficient is used. Using non-black objects as visibility markers can give errors up to 50% if they are illuminated by the sun, but the errors will be below five per cent if they are in their own shadow. The errors due to a varying contrast threshold of the eye can be considerable, if the visibility markers are too small. By proper selection of the visibility markers it will be possible to use the Koschmieder Formula to calculate the extinction coefficient from observed visibilities with an error of less than about 10 %. (Author abstract)

13105 APTIC NO. 30661

Hrdlovic, P., J. Pavlinec, and H. H. G. Jellinek

DEGRADATION OF POLYMERS AND MORPHOLOGY: PHOTO-OXIDATIVE DEGRADATION OF ISOTACTIC POLYSTYRENE IN PRESENCE OF SULFUR DIOXIDE AS FUNCTION OF POLYMER CRYSTALLINITY. *J. Polymer Sci., 9(5): 1235-1245, May 1971. 14 refs.*

The photooxidative chain scission of isotactic polystyrene films was studied as a function of the degree of crystallinity, sulfur dioxide and nitrogen dioxide pressures, and temperature. The rate of chain scission increased in the presence of SO2 with the extent of crystallinity. It is believed to be faster in the crystalline areas than in the amorphous regions because of strain in or near the folds. In the presence of NO2, chain scission increased up to eight percent crystallinity, but became constant with a further increase in crystallinity. It is suggested that the diffusion of NO2 and oxygen into the films decreases with increasing crystallinity. These two processes compensate each other. (Author summary modified)

13106 APTIC NO. 30737

Hugel, Marie-France

A STUDY OF SOME COMPONENTS OF POLLEN. *(Etude de quelques constituants du pollen). Ann. de l Abeille, 5(2):97-133, 1962. 65 refs. Translated from French. Dept. of Agriculture, Beltsville, Md., Bee Culture Library, 27p., April 1964.*

Research being conducted on the chemistry of pollen was reviewed. The principal results obtained from the pine tree pollen which causes sarcoidosis were reported. Various samples of pollen, collected by bees, such as mixed pollen, apple pollen, and rockrose pollen were examined. The substances attractive to the bees as well as substances that can be obtained in the pure state were identified. The substance 24-methylene-cholesterol was isolated from two pure pollens and one mixed pollen. It was previously shown that insects cannot synthesize sterols. Hence, the 24-methylene-cholesterol isolated from bees could come either from the food or a transformation of a phytosterol. Having isolated 24-methylene-cholesterol in a considerable quantity from different pollens shows the purely food origin of this sterol.

13107 APTIC NO. 30821

Hughes, Randall and Bruce Bohor

RANDOM CLAY POWDERS PREPARED BY SPRAY-DRYING. *Amer. Minerologist, vol. 55:1780-1786, Sept.-Oct. 1970. 5 refs.*

A simple and efficient method for spray-drying clay powders was developed in conjunction with an examination of kaolinite crystallinity. The sprayer was tested and shown to be useful in preparing samples for x-ray, electron microscope, and infrared analyses. Samples of illite, smectite, attapulgite, vermiculite, and halloysite were also spray-dried and examined in lesser detail by x-ray diffraction and scanning electron microscopy. As shown by x-ray and/or scanning electron microscopy, all of the samples examined were randomized by spray-drying. Individual crystallites may either be arranged randomly within and/or tangentially to the fine-sized spherical droplets produced in spraying. Regardless of the individual aggregate fabric, the large numbers of spheres involved in the total powder diffraction are responsible for the randomization effects attained. (Author abstract modified)

13108 APTIC NO. 30609

Kadyschew, I. K., S. A. Nikolski, W. P. Pachomow, and J. M. Pjatin

THE INCREASE OF THE SENSITIVITY OF PROBES FOR MEASURING THE SPEED OF GAS STREAMS. *(Empfindlichkeitserhoehung von Sonden zur Messung der Geschwindigkeit von Gasstroemen). Text in German. Feinwerktechnik, 75(3):131-133, March 1971. 1 ref.*

Of the methods used in practice to measure gas flow velocities, those based on pressure determination by means of probes exposed to the streaming gas are the most widely used. Unfortunately at low velocities these methods are very inaccurate because of the low dynamic pressure. The method described eliminates this drawback by using a rotating probe of constant velocity which registers much higher pressures than a stationary probe. The practical application of this method can be executed in two variations. In the first, the counterpressure recorded by the probe is passed on through a tube to a membrane located in a hermetically sealed housing which rotates with the probe. The oscillations of the membrane are transformed by a potentiometer into electrical signals which activate an indicator. In this variation, the constant oscillation of the membrane leads to material fatigue and overuse of the potentiometer. The second variation eliminates this disadvantage by measuring the difference between maximum and minimum instantaneous pressure. During one revolution of the probe, there are two positions in which the direction of the peripheral speed runs either in the same or in the opposite direction of the gas flow. In one position, the peripheral velocity of the probe is opposed to the gas flow velocity while in the other, they coincide. In the first position, the probe registers a maximum pressure value; in the second, a minimum pressure value. The difference of these instantaneous values is a function of the measured gas velocity. A pneumatic collector transmits the instantaneous values of the rotating probe to a stationary indicator.

13109 APTIC NO. 30284

King, Keith D., David M. Golden, and Sidney W. Benson

ABSOLUTE RATE CONSTANTS AND ARRHENIUS PARAMETERS FOR THE REACTION OF BROMINE ATOMS WITH ETHANE. *Trans. Faraday Soc., 66(575), Part II:2794-2799, Nov. 1970. 17 refs.*

The direct thermal bromination of ethane was studied spectrophotometrically in a static system at 221-319 C. Absolute rate constants and Arrhenius parameters were determined for the reaction, the mechanism of which is discussed. The Arrhenius A factor is higher than that obtained by competitive experiments, but in complete agreement with both collision theory and transition-state theory predictions. It is suggested that the Arrhenius parameters for the reactions of Br + CH3Br and Br + CH4 may need reinvestigation. (Author abstract modified)

13110 APTIC NO. 30317

King, Keith D., David M. Golden, and Sidney W. Benson

KINETICS AND THERMOCHEMISTRY OF THE GAS-PHASE BROMINATION OF BROMOFORM. THE C-H BOND DISSOCIATION ENERGY IN CHBR3 AND THE C-BR BOND DISSOCIATION ENERGY IN CBR4(LA). *J. Phys. Chem., 75(7):987-989, 1971. 11 refs.*

Since the quoted values for the heat of formation of bromomethanes have some differences, the thermal bromination of bromoform (CHBr3) was studied which yields values for the bond dissociation energies, DH deg (CBr3-H), and DH deg (CBr3-Br), and the heat of formation difference, delta Hf deg carbon tetrabromide delta Hf deg (CHBr3). Reagent grade bromine was treated with potassium bromide to remove chlorine and degassed at liquid nitrogen temperatures before use. Bromoform was then degassed before use. Reaction rates were determined from the rate of disappearance of Br2 measured spectrophotometrically. Also, the pressure of Br2 at equilibrium was measured directly, and the pressures of the other species were calculated from the stoichiometry. The heat of formation difference was calculated as 14.4 + or 0.7 kcal/mol which is consistant with Bernstein s estimates for CHBr3 and Cbr4 and the NBS values. However, several factors indicate that these estimates were in error. Therefore, experimental factors and transition-state theory were taken into consideration to give bond disassociation energies of DH at 298 K (Cbr3-H) equals 96.0 + or 1.6 kcal/mol and DH at 298 K (CBr3-Br) equals 56.2 + or - 1.8 kcal/mol.

13111 APTIC NO. 30281

Lefebvre-Brion, H.

INTENSITY ANOMALY IN THE PHOTOELECTRON SPECTRUM OF NO. *Chem. Phys. Letters (Amsterdam), 9(5):463-464, June 1, 1971. 7 refs.*

A new interpretation is given of the highest peaks observed in the photoelectron spectrum of nitric oxide. The interpretation is based on the fact that if some states have anomalous intensities, they must be represented by mixing with doubly excited configurations and, consequently, their peaks must be broadened and their intensity weakened. (Author abstract modified)

13112 APTIC NO. 30627

Leventhal, J. J.

COLLISION MECHANISM LEADING TO THE FORMATION OF NO(+) IN O(+)-N2 COLLISIONS. *J. Chem. Phys., 54(12):5102-5103, June 15, 1971. 9 refs.*

The energetics of the reaction O(+) + N2 yields NO(+) were investigated for the kinetics-energy range three to twelve energy volts. An O(+) beam, produced in an electron impact ion source and mass selected with a conventional 60 degree magnetic spectrometer, enters a collision cell containing neutral nitrogen gas at low pressure. Emerging ions are energy analyzed with an electrostatic energy selector and mass identified with a quadrupole mass filter. Detection is accomplished with a particle multiplier and standard counting techniques. The product NO(+) ion is formed with excess internal energy. The heats of reaction obtained are consistent with the formation of NO(+) in a stripping-type collision process above four energy volts incident ion energy.

13113 APTIC NO. 30204

Marani, Alessandao and Alberto Paratella

CALCULATION OF THE MOLECULAR INTERACTION PARAMETERS OF NON-POLAR GASES. *(Calcolo dei parametri d interazione molecolare dei gas non-polari). Text in Italian. Quad. Ing. Chim. Ital., 7(2):19- 26, Feb. 1971. 9 refs.*

This sequel to an article analyzing the causes of error in determining the parameters of interaction potential on the basis of the measured properties of molecular transport gives particular attention to the effects on temperature induced by the behavior of the collison. The procedures discussed are unified into a single program, suitable for processing with an electronic computer. Comments are given on the sensitivity of such determinations and their practical application. A table shows the results obtained from such calculations, using carbon monoxide, argon, and helium as the test gases. The calculation program consists of three separate and parallel mathematical procedures each of equal validity.

13114 APTIC NO. 30377

Marvich, Robert H. and Hans H. Brintzinger

A METASTABLE FORM OF TITANOCENE FORMATION FROM A HYDRIDE COMPLEX AND REACTIONS WITH HYDROGEN, NITROGEN, AND CARBON MONOXIDE. *J. Am. Chem. Soc., 93(8):2046-2048, April 21, 1971. 13 refs.*

A titanocene species with unusual reaction properties was generated by suspending and stirring a hydride complex ((C5H5)2TiH)2 in a solvent like diethyl ether. The hydride complex itself was obtained by treating a saturated hexane solution of dimethyltitanocene, (C5H5)2Ti(CH3)2, with hydrogen gas at 0 deg. Although a metastable titanocene isomer, the (C5H5)2Ti species differs dramatically in its modes of reaction from the more stable (C10H9TiH)2 isomer. When exposed to carbon monoxide, an ether solution of ((C5H5)2Ti)2 immediately absorbed CO to form the carbonyl complex(C5H5)2Ti(CO)2. This reaction with CO is irreversible. Reversible uptake occurred when solutions of ((C5H5)2Ti)2 were exposed to hydrogen gas at one atm. Slightly cooled solutions of $((C_5H_5)_2Ti)_2$ in ether, upon exposure to nitrogen gas, instantaneously absorbed N_2 to form an intensely blue complex. The N_2 complex was so strikingly familiar in composition, stability, and color to that formed from N_2 and decamethyltitanocene, that there was no reasonable doubt about its structural assignment as a bone fide $(C_5H_5)_2Ti$ derivative.

13115 APTIC NO. 30268

Mazur, Stephen and Christopher S. Foote

CHEMISTRY OF SINGLET OXYGEN. IX. A STABLE DIOXETANE FROM PHOTOOXYGENATION OF TETRAMETHOXYETHYLENE. *J. Am. Chem. Soc., 92(17):3225-3226, May 20, 1970. 19 refs.*

A 1,2-dioxetane preparation was obtained by photooxygenation of 1,1,2,2-tetramethoxyethylene in ether at -70 deg. Both visible light and sensitizer (zinc tetraphenylporphine or dinaphthalene thiophene) were found to be essential. Data are presented on the molecular weight of the product and on its nuclear magnetic resonance and infrared spectra. The dioxetane structure has a close relationship to the carbon dioxide dimer which has been implicated as the key intermediate in the chemiluminescent reaction of oxalyl halides and esters with H_2O_2, and to the suggested dioxetane intermediate in the chemiluminescent oxidation of tetrakis (dimethylaminoethylene). Preparation of the product did not require that 1,2 cycloaddition of singlet oxygen be concerted.

13116 APTIC NO. 30271

Minasyan, Sh. O., Yu. I. Shumyatskii, N. V. Kel tsev, and N. S. Torochesnikov

CHEMISORPTION OF SULPHUR TRIOXIDE ON H-MORDENITE. *Russ. J. Phys. Chem. (English translation from Russian of: Zh. Fiz. Khim.), 44(12):1781-1783, 1970. 9 refs.*

Aqueous extracts were obtained from H-mordenite specimens treated with 0.015 vol% sulfur trioxide at 25-400 C, and then analyzed colorimetrically. The relation between the aluminum content of the aqueous extract and treatment temperature had two maxima (at 100 and 300 C), the second coinciding with the maximum on the adsorption isobar for SO_3 on H-mordenite. The form of the relation obtained may be explained by the presence in H-mordenites of at least two types of active centers for adsorption. (Author abstract modified)

13117 APTIC NO. 30629

Mulcahy, M. F. R. and R. H. Smith

REACTIONS OF OH RADICALS IN THE H-NO2 AND H-NO2-CO SYSTEMS. *J. Chem. Phys., 54(12):5215-5221, June 15, 1971. 14 refs.*

A mass spectrometric study was conducted of the stoichiometry of the reactions of hydroxyl radicals generated by the reaction H + NO_2 yields OH + NO. The conditions of the study were similar to those used in previous studies of the kinetics of the reactions of OH radicals with each other and with carbon monoxide. Contrary to previous assumptions, when hydrogen atoms are intially in excess over nitrogen dioxide, the reactions 2OH yields H_2O + O, O + OH yields O_2 + H, and OH + CO yields CO_2 + H, do not completely account for the decay of OH. When hydrogen atoms are in excess, an additional reaction occurs which produces water. It has been identified as a recently observed first-order heterogeneous reaction of OH radicals. When NO_2 is initially in excess over hydrogen, a fast reaction occurs involving OH radicals and NO_2. This is probably the reaction OH + NO_2 yields HNO_3. (Author abstract modified)

13118 APTIC NO. 30235

Nicolaon, G., D. D. Cooke, M. Kerker, and E. Matijevic

A NEW LIQUID AEROSOL GENERATOR. *J. Colloid Interface Sci., 34(4):534-544, Dec. 1970. 10 refs.*

A new liquid aerosol generator was designed and tested. Helium, which serves as the carrier gas, picks up sodium chloride nuclei in a combustion furnace and then passes down a vertical tube along the sides of which flows a film of dibutyl phthalate (DBP) maintained at an elevated temperature. The aerosol is formed by condensation of DBP on the nuclei as the mixture is cooled upon leaving the tube. This generator is capable of maintaining a stable output of aerosol over a long period of time. Furthermore, after extended shutdown, it will reproduce the same aerosol for the same operating conditions. Experimental data are presented on the influence of furnace temperatures, DBP film temperature, flow rate, dilution of nuclei, and other factors on particle size distribution. The particle size distribution was obtained by an analysis of light scattering. (Author abstract modified)

13119 APTIC NO. 30236

Nicolaon, G., D. D. Cooke, E. J. Davis, M. Kerker, and E. Matijevic

A NEW LIQUID AEROSOL GENERATOR. II. THE EFFECT OF REHEATING AND STUDIES ON THE CONDENSATION ZONE. *J. Colloid Interface Sci., 35(3):490-501, March 1971. 15 refs.*

The aerosol generator described is characterized by the passage of a nuclei-laden gas stream (sodium chloride in helium) down a vertical tube along the wall of which flows a film of dibutyl phthalate (DBP) maintained at an elevated temperature. The aerosol is formed by condensation of DBP on the nuclei as the mixture is cooled upon leaving the tube. If the aerosol is heated so that it reevaporates and then condenses upon further cooling, an aerosol having a considerably smaller size distribution is obtained. Condensation occurs in a parabolodial-shaped isothermal region. Theoretical heat transfer calculations agree with temperature measurements and predict precisely the observed shape of the parabolodial condensation zone. Theoretical estimates of the size of the nuclei were made using values of the supersaturation in the condensation zone obtained from experiment. The radial variation of the size distribution of the aerosol, as well as its continued growth downstream from the condensation zone, was measured. The formation of the aerosol is primarily an equilibrium process. Growth is very rapid after the onset of nucleation. (Author abstract modified)

13120 APTIC NO. 30658

Samuilov, E. V. and N. N. Tsitelauri

TRANSFER PROPERTIES OF CHEMICALLY REACTING GASES. I. COEFFICIENTS OF THE APPROXIMATING FUNCTIONS FOR THE EFFECTIVE CROSS SECTIONS OF THE COMPONENTS OF GAS MIXTURES CONTAINING H, C, N, AND O ATOMS AND THEIR COMPOUNDS. *High Temp., (English translation from Russian of: Teplofiz. Vys. Temp.), 8(4):714-720, July-Aug. 1970. 5 refs.*

For convenience in calculating the kinetic coefficients of gases with an electronic computer, it is best to express the values of the collision integrals in the form of simple approximating functions of the temperature T. The collision integrals were approximated in this way for various interacting pairs of the following components: carbon dioxide, carbon monoxide, molecular hydrogen, molecular oxygen, molecular nitrogen, water, nitric oxide, hydroxyl radical, atomic oxygen, atomic nitrogen, atomic hydrogen and HCO.

13121 APTIC NO. 30618

Schwieler, Gosta H., James S. Douglas, and Arend Bouhuys

POSTNATAL DEVELOPMENT OF AUTONOMIC EFFERENT INNERVATION IN THE RABBIT. *Am. J. Physiol., 219(2):391-397, Aug. 1970. 28 refs.*

A study was made of the effects of electrical stimulation of appropriate efferent autonomic nerves on heart rate and tracheal smooth muscle tone in one-day-old to adult rabbits, lightly anesthetized with urethan and sodium pentobarbital and ventilated artificially. Parasympathetic and sympathetic responses, of the same order of magnitude as in adult animals, could be produced at or shortly before birth. In animals older than 4-6 weeks, sustained responses could be produced at stimulation frequencies as high as 200 impulses/sec. However, in animals less than one-week old, the responses decreased or ceased completely before the end of the 15-60 sec stimulation period at frequencies above 50-70 C impulses/sec. The decrease of the responses was not related to the total number of stimulation impulses, and was accentuated by anesthesia but prevented by physostigmine. The results show that an autonomic efferent innervation is established at an early postnatal stage in rabbits and that the ability of maturing nerve fibers to transmit impulses continually at high frequencies increased during the first 4-6 postnatal weeks. (Author abstract modified)

13122 APTIC NO. 30574

Scott, P. M., K. F. Preston, R. J. Anderson, and L. M. Quick

THE REACTION OF THE ELECTRONICALLY EXCITED OXYGEN ATOM O(1D2) WITH NITROUS OXIDE. *Can. J. Chem., 49(11):1808-1817, June 1971. 32 refs.*

An investigation has been made of the relative importance of the possible pathways for the reaction at room temperature between the excited oxygen atom O(1D2) and nitrous oxide. The photolysis of ozone, nitrogen dioxide, and N2O was used as a source of the excited atom. The four possible pathways are: O(1D2) + N2O yields nitrogen and oxygen, O(1D2) + N2O yields 2 nitric oxide; O (1D2) + N2O yields N + nitrogen dioxide, and O(1D2) + N2O yields O(3P) + N2O. Measurements of the yields of nitrogen and nitric oxide from the photolysis of 2288 A of mixtures of NO2 and N2O has led to a value of 1.01 plus or minus 0.06 for the ratio of the rate constants for the first two reactions. This is in excellent agreement with the value of 0.99 plus or minus 0.06 obtained from determinations of the yields of N2 and NO2 arising from the flash photolysis of O3-N2O mixtures. The isotopic composition of the nitrogen produced in the photolysis of NO2-N2O mixtures indicated that the ratio of the rate constants for the first and third reactions is less than .005. It is also suggested that deactivation (last reaction) does not make an important contribution to the total rate constant for destruction of O(1D2). (Author abstract modified)

13123 APTIC NO. 30255

Smirnov, G. F., L. M. Belyy, and Z. R. Gorbis

ON THE DETERMINATION OF TIME OF STAY OF SOLID PARTICLES IN THROTTLED GAS SUSPENSION IN A HEAT EXCHANGER. *(K opyedeleniyu vremeni dvizheniya (teploobmena) tverdykh chastits v tormozhennoy gazovzvesi). Text in Russian. Izv. Vysshikh Uchebn. Zavedenii, Energ. (Minsk), no.5:120-123, 1970. 2 refs.*

The process taking place in a heat exchanger with gas suspension counterflow was analyzed. The value of form coefficient C was determined from the comparison of the experimentally determined ratio t sub F/t sub T (time of stay of a particle in a free counterflow gas suspension/time of particle stay in a throttled suspension) with the ratio evaluated from a previously derived equation. Under certain conditions, coefficient C is equal to 1.51 times k sub v to the 0.545th power, where k sub v is a coefficient of aerodynamic throttling. The experimentally determined time of stay of the particle in a gas suspension was compared with values calculated from a theoretically derived equation. Good agreement was obtained (the difference was less than 8%), which confirms the validity of the theoretical consideration.

13124 APTIC NO. 30228

Solly, Richard K. and Sidney W. Benson

KINETICS OF THE GAS-PHASE REACTION OF BENZALDEHYDE WITH IODINE. THE HEAT OF FORMATION AND STABILIZATION ENERGY OF THE BENZOYL RADICAL. *J. Am. Chem. Soc., 93(7):1592-1595, April 7, 1971. 18 refs. (Presented at the American Chemical Society, National Meeting, 158th, New York, Sept. 1968.)*

The gas-phase reaction of benzaldehyde with iodine (PhCHO + I2 yields PhCIO + HI) was studied spectrophotometrically in a static system at PhCHO pressures of 7-56 torr and I2 pressures of 2-46 torr. At 216-308 deg, the initial rate of disappearance of I2 is first order in (PhCHO) and half order in (I2). These kinetics are consistent with PhCHO + I yields PhCO + HI(1) as the rate determining step, for which kl was found to be log (kl, reciprocal M reciprocal sec) equals (10.08 plus or minus 0.16)-(16.69 plus or minus 0.36) Theta, where Theta equals 2.303 RT kcal/mol. This leads to a benzaldehyde carbonlyl C-H bond strength of 86.9 kcal/mol. From this activation energy (PhCO) is calculated to be 26.1 plus or minus 2 kcal/mol. This value is identical with the carbonyl C-H bond strength of formaldehyde and acetaldehyde. From thermochemical and electron spin resonance data, it is shown that stabilization of formyl radicals, RCO, is independent of the R and may be explained by conjugation of the odd electron with one of the oxygen lone-pair electrons. In terms of the benzoyl radical, all evidence is consistent in that there is no contribution to the radical stability from structures in which the unpaired electron is conjugated with the aromatic ring. (Author abstract modified)

13125 APTIC NO. 30823

Soo, S. L.

THINK TWO-PHASE. *In: Advances in Solid-Liquid Flow in Pipes and its Applications. Iraj Zandi (ed.), New York, Pergamon Press, 1971, Paper 2, p. 35-38. 12 refs.*

Examples of solid-liquid flow were presented. The need for recognizing the different mass velocities of phases is obvious when the instance of sedimentary flow is studied where the center of mass mean velocity of the phase is uninformative. This makes it important to account for the particles as a separate entity from the fluid. In order to give a correct description of physical systems, proper indentification of the boundary conditions and flow regimes must be made from physical understanding. Some of these physical considerations are obvious: at a wall, when particle velocity reaches zero and if the particle diffusivity is negligible, particle deposition is expected; the maximum density attainable is that of its packed or moving bed. An instance of the need for proper identification of boundary conditions is illustrated in the case of turbulent pipe flow of a suspension.

13126 APTIC NO. 30250

Tabaczynski, Rodney J., David P. Hoult, and James C. Keck

HIGH REYNOLDS NUMBER FLOW IN A MOVING CORNER. *J. Fluid Mech. (Cambridge), 42(2):249-255, June 1970. 2 refs.*

Two visual flow techniques were used to study the type of flow found when a piston moves in a cylinder. The first technique utilized a dilute solution of aluminum flakes in water. A beam of light was passed through a diameter of the cylinder to visualize a plane of the flow. The aluminum flakes that were in motion aligned themselves with the shear while the flakes that were not in motion oriented themselves randomly, thus allowing observation of the motion in this plane. The second technique consisted of placing a strip of dye along the bottom of the cylinder and watching the motion of the dye as the wall moved. In both cases, motion was recorded with a movie camera. A vortex motion was observed at the piston face and cylinder wall interface as the cylinder wall moved toward the piston. Nondimensional scalding parameters for the vortex size and stability, and semi-empirical theories for the size of the vortex, are presented. (Author abstract modified)

13127 APTIC NO. 30730

Turman, B. N.

MEASUREMENT OF SOUND VELOCITY IN A SOLID-GAS MIXTURE. *Aerospace Research Labs., Wright-Patterson AFB, Ohio, Energetics Research Lab., proj. 7116-0001, ARL-70-0128, 39p., July 1970. 14 refs.*

NTIS, DDC: AD 712412

Velocity of sound through a mixture of air and moderately large solid particles (glass spheres) was measured as a function of solid particle concentration. The solid particles were allowed to fall through a vertical tube, essentially at terminal velocity. This tube was part of an acoustic network containing a driving source (loud-speaker), a receiver (microphone), and an acoustic impedance (connecting tubes). Phase difference between the driving signal and microphone signal was measured as a function of particle concentration, and the relation between phase difference, particle concentration, and sound velocity was derived. The possibility of using the experimental apparatus as a diagnostic instrument for measuring density in linear flows is discussed.

13128 APTIC NO. 30625

Young, W. S., W. E. Rodgers, C. A. Cullian, and E. L. Knuth

SUPERSONIC MOLECULAR BEAMS WITH CYCLING-PRESSURE SOURCES. *AIAA (Am. Inst. Aeron. Astronaut.) J., 9(2):323-325, Feb. 1971. 7 refs.*

Investigations of steady supersonic molecular beams indicate that, for a single species beam operating under ideal conditions (no skimmer interactions and no attenuations due to background gases), the beam density is proportional directly to the source density. Skimmer interference has been found to depend on stagnation chamber conditions, source-chamber conditions, and nozzle-skimmer distance. For a cycling-pressure source, both stagnation-chamber conditions and source-chamber conditions change during the cycle with the result that a given nozzle-skimmer distance is not optimum for all parts of the cycle. Using a single inert species, those problems which are unique to a cycling-pressure source were investigated. A modified model airplane engine with a 1.04-cm bore, 1.22-cm stroke, and a volume compression ratio of eight was used as the beam source. Data taken to demonstrate the increasing skimmer-interference effects due to increasing mass-flow rates are presented. Beam density decreases dramatically, particularly in the vicinity of the top dead center, as the mass-flow rate increases. An analysis of source-chamber flow indicates that the observed lag of the source- chamber pressure peak behind the source pressure peak is determined by the ratio of the booster-pump characteristic time and the source-cycle period. The smaller source-chamber pressure peak appearing in the early part of the cycle is due to superpositioning of residual gas from the previous cycle and gas from the present cycle. For small nozzle-skimmer distances, strong skimmer intereference occurs near the peak density of the cycle; for large nozzle-skimmer distances, the beam density is attenuated throughout the cycle. Peak beam density increases with engine speed.

EFFECTS-HUMAN HEALTH

13129 APTIC NO. 30150

Fukuoka Prefectural Government (Japan)

THE RESEARCH FOR THE EFFECTS OF AIR POLLUTION ON THE HUMAN BODY. (I) EPIDEMIOLOGICAL STUDIES OF THE EFFECTS OF AIR POLLUTION ON THE HUMAN BODY. *(Taikiosen no seitai ni oyobosu chosa kenkyu. (1) Taikiosen ga jintai ni oyobosu eikyo ni tsuiteno ekigakuteki chosa kenkyu). Text in Japanese. p. 221-291, March 1968.*

In Yahata-ku, Kitakyushu City (a polluted district), Amagi City (a control district), and Minami-ku in Fukuoka City (a district between the polluted and control districts), the rates of doctors consulted for various diseases were determined with the medical cards of the new patients who used the National Health Insurance between April 1, 1965 and March 31, 1966; 144,738 cards came from Yahata; 115,758 from Minami; and 68,055 from Amagi. Then the rates of doctors consulted for these diseases were collected by district, age, sex, and month and were compared with each other. The corrected incindence rate of each district was obtained by using the Yahata rates in 1960 as a reference level. The diseases were classified as respiratory, naso-pharyngeal, and ophthalmic related to air pollution, specific diseases with malignant tumors, and general diseases including every disease except the specific ones. Specific diseases were divided into those closely connected with and those less-closely connected with air pollution. The rates of doctors consulted for specific diseases were 40.8% at Yahata, 42.44% at Minami, and 39.98% at Amagi; for diseases closely connected with air pollution, the rates were 17.01%, 16.03% and 12.51% respectively. Comparison of diseases related to air pollution by month showed the rate at Minami was almost always lower than that of Yahata; however, a little difference was present between the two. Yahata showed the highest values in the rates of consulted doctors for bronchitis, asthma, pulmonary tuberculosis, nasal catarrh, inflammation of the upper respiratory tract, intraophthalmic foreign body, and cancers of the lung and the stomach.

13130 APTIC NO. 30156

LEAD IN THE GASOLINE, DANGEROUS, HARMLESS: INDUSTRIAL ENTERPRISE INFORMS GOVERNMENT

OFFICIALS – MEDICAL DOCTORS COMMENT. (Blei im Kraftstoff gefaehrlich harmlos. Industrieunternehmen informiert Parlamentarier - Mediziner kommentieren). Text in German. Umwelt (Duesseldorf), 1(2):31-33, 1971.

The company AK Chemie G.m.b.H. published a comment on the proposed law on reduction of the lead content in gasolines. The comment stated that lead is a natural component of the earth s crust. A reduction of the lead content will have no effect on lead metabolism in man. Lead compounds in gasoline also have no effect on human health. It is much more important to reduce the emission of unburned hydrocarbons, carbon monoxide, and nitrogen oxides. Contrary to this opinion, medical doctors have voiced concern about continued inhalation of lead compounds. Lead is readily resorbed in the lung. Chronic lead inhalation may lead to an accumulation in the bones, which is harmful. Any reduction of the lead content in the atmosphere should be welcome.

13131 APTIC NO. 30181

Toyama Prefecture (Japan)

REPORT ON HEALTH EXAMINATION OF OSHIMA AND DAIMON TOWN S INHABITANTS. *(Oshima, daimon cho jumin kenkochosa hokoku). Text in Japanese. 84p., Dec. 1970. 3 refs.*

Health examinations of individual residents in the towns of Oshima and Daimon in Toyama Prefecture were reported. An industrial plant located in the area produces 44,600 tons of high carbon ferro chromium and 3200 tons of low or medium carbon ferro-chromium annually. An environmental air pollution survey was conducted for three days from Oct. 20 to Oct. 22, 1970. It indicated that the average density of the suspended dust was 169.5 microgram/cu m for seven locations. Metals contained in the dust included iron, 3.94; manganese, 0.34; copper, 0.13; chromium, 0.26; nickel, 0.04; lead, 0.30; zinc, 1.55; cadmium, 0.01; calcium, 1.8; and magnesium, 1.36, all in micrograms/cu m. The purpose of the health examination was to find out how smoke and dust from the plant affects the health of the local inhabitants. A preliminary study was made with a questionnaire answered by the inhabitants which covered age, sex, place of employment, length of residence, smoking habit, and various symptoms of physical uneasiness including coughing, phlegm, asthma, throat pain, nose trouble, back ache, headache, breathing difficulties, and skin irritation. Those answering yes to four or more symptoms, or complaining of skin or eye diseases were given a second physical check consisting of an orgal diagnosis, X-rays, lung function examination, and urinalysis. Those requiring a further check were examined for hearing and given direct X-ray examinations, blood tests, and lung function tests. The results obtained from all the three health examinations were tabulated.

13132 APTIC NO. 30351

Mie Prefecture (Japan)

A REPORT OF INVESTIGATING INFLUENCES OF SOOT AND DUST: 1969. *(Baien to eikyo chosa kekka hokoku, Showa 44 nendo). Text in Japanese. 124p., 1970, (?).*

At Yokkaichi city in Mie Prefecture, investigations were made in June and September 1969 and again in February 1970 to determine the effect of air pollution on the health of school children. The subjects were 248 sixth-grade children from two schools in a a polluted district and 104 sixth-grade children from two schools in an unpolluted district (control district). Information was gathered through medical examinations, questionnaires, pertaining to the children s health, a study of absence records, and a survey of environmental conditions. The return rate of the questionnaire was 95%. A significant difference was seen between polluted and unpolluted districts for three items; home environment, prevalence of respiratory diseases such as chronic bronchitis among family members, and symptoms of eye and respiratory diseases. The rate of absence caused by acute bronchitis was significantly high in July, November, December, and February in schools located in the polluted district. The questionnaires revealed that a medical history of asthmatic bronchitis and subjective symptoms of pharynalgia, cough, sputum, and headache were significantly more common in schools of the polluted district. Schoolgirls in the polluted district showed significantly less capacity of breathing function measured by the one second rate. As determined by comparing timed vital capacity according to body length in five cm intervals, about two-thirds of 60 groups were superior in the unpolluted district. Respiratory resistance, as measured by body plethysmography in February, was significantly greater among boys in the polluted district at one percent risk. The amount of atmospheric dust fall during the investigation of environmental conditions was 12.9 t/sq Km/month in the polluted district and 8.5 t/sq Km/month in the unpolluted district. The quantity of sulfur dioxide during the same period was 1.58 mg/100 sq cm/day in the polluted district and 0.15 mg/100 sq cm/day in the unpolluted district.

13133 APTIC NO. 30363

Osaka City Inst. of Hygiene (Japan)

ANIMAL EXPERIMENT OF CHRONIC EXPOSURE TO GASES RELATED TO THE STANDARD OF AIR POLLUTION. *(Taiki osen kankyo kijun ni kansuru dobutsu mansei bakuro jikken). Text in Japanese. 67p., May 1968.*

The effects of long-term exposure to sulfur dioxide and carbon monoxide on young rats were investigated. Twelve rats were reared with VB1-deficient feed and normal feed under the conditions of 0.1 ppm and 0.5 ppm SO2 and under air filtered through activated carbon. Experiments of exposure to 30 ppm and 100 ppm of CO were also conducted under the same feeding conditions. No influence on body weight and VB1 content in organs was observed in the animals after an exposure of two to five weeks. Rats under VB1 deficiency seemed to increase in SO2 sensitivity. Alterations of the mucosal epithelium, submucosal edema, and increased mucus secretion were observed in the trachea. Expansion of the alveolar cavity was seen in the rats which were reared with VB1 deficient feed and normal feed. The more significantly this symptom was observed, the higher the SO2 concentration and the longer the time of exposure. Physiological and patho-histological investigations of the experiment of CO exposure are now being conducted.

13134 APTIC NO. 30365

Osaka Prefectural Government (Japan)

ANIMAL CHRONIC EXPERIMENTS FOR ENVIRONMENTAL STANDARDS OF MOTOR VEHICLE WASTE GASES. *(Jidosha haigasu kankyokijun ni kansuru dobutsu mansei jikken). Text in Japanese. 52p., 1970 (?). 6 refs.*

To use the photometric method developed by Kampen for the micro- determination of carboxyhemoglobin, a calculating equation for mice was experimentally obtained. From an isobestic wave length of 577 millimicron and a COHb maximum absorption wave length of 538 millimicron, the OD ratio (D538/D577) was obtained and as an experimental equation COHb(5) equals (D538/D577 times 2.79-2.99) times 100 was calculated. The determination limit and the accuracy of this experimental equation are one and five percent plus or minus one COHb, respectively. After continuous exposure of mice for one to 1.5 months to 600 ppm, 100 ppm, and 50 ppm of carbon monoxide gas and to a mixture of CO and nitrogen dioxide, the effects on COHb quantity, pathological-histological observation, and immunocellular activity were observed. Throughout the CO exposure period, COHb moved on a fairly constant level. The COHb quantity increased and produced a significant difference between the mixture gas and the CO single exposure groups on the third day. It reached a constant level two hours after the CO single exposure began and decreased to less than one-third 30 minutes after exposure stopped. During the 50 ppm CO exposure, mice in their growth period showed a higher total Hb quantity, but mice after puberty showed a lower level in total Hb than the control group. By the pathological-histological observation of the central nervous system of exposed mice, slight congestions in the medullary membrane and in the brain were observed. Congestion in the lungs was seen in the 50 ppm exposure group. In the 600 ppm exposure group, congestion and edema were observed in the medullary membrane. It is suggested that NO2 exposure reduces lung clearance and phagocytic migration.

13135 APTIC NO. 30640

Committee of Mie Prefectural Medical Insurance on Public Nuisance (Japan)

CLINICO-PATHOLOGICAL RESEARCH OF RESPIRATORY DISEASES PATIENTS DUE TO AIR POLLUTION.

(Taikioseni ni yoru kokyukishikkan no rinsho- byotaigakuteki kenkyu). Text in Japanese. 10p., March 1968.

Examinations were performed on 126 patients of Yokkaichi City, and their clinical picture was observed. The observation was made by dividing the patients into two groups: A group of 27 who became ill before 1959, before the oil complex began operation, and B group of 97 who became ill after 1960. In B group, 64 persons had bronchial asthma, 23 had chronic bronchitis, 10 had emphysema, and six of the 10 who had emphysema also had bronchial asthma. Emphysema is derived from bronchial asthma in Yokkaichi City. Bronchial asthma occurred mainly in those between the ages of 20 and 40 in A group, and in B group, mainly in those over 50. It was observed that pulmonary function in A group patients was worse than that in B group patients. This is probably due to the fact that those in A group had a longer history of illness. The positive rates of CRP were markedly higher in the pulmonary emphysema patients of the A group being 50%, and in the bronchial asthma patients of the B group, being 30%, respectively. The chronic bronchitis patients of groups A and B, and the emphysema patients of group A had a somewhat higher level of the alpha 2 fraction. In all illness types and patterns, 17-OHCS was decreased during seisure. A significant decrease of serum cholinesterase occurred in bronchial asthma patients. In bronchial asthma patients, plasma histamine increased to twice the normal amount when not in seizure, and even more during seizure.

13136 APTIC NO. 30641

Osaka Prefectural Government (Japan)

ANIMAL EXPERIMENT FOR ENVIRONMENTAL STANDARD OF AUTOMOBILE EXHAUST GASES.

(Jidoshahaigasu kankyokijun ni kansuru dobutsu mansei jikken). Text in Japanese. 55p., 1969 (?). 8 refs.

To determine the effects of automobile exhaust gases, mice were continuously exposed to nitrogen dioxide. Amounts of reduced glutathione (GSH) in the lung and the liver tissue were biochemically and patho-histologically observed. The results revealed that catarrhal changes in the trachea and the lung occurred, when the animals were continuously exposed to 0.7 0.8 ppm of NO2 for one month. The effects of NO2 extended to the depth of the lung. The quantitative level of GSH in the lung was immediately reduced by introducing NO2 into the lung field but was replenished by the transportation of GSH into the liver. However, when the exposure was continued for a month, compensational function of the liver became weak, and the quantitative level of GSH fell. When the exposure was prolonged, this level was expected to become less than normal. The effects of micro-particles and NO2 on migration, clearance, and phagocytosis, and the synergistic action of NO2 and x-ray irradiation on the weight of mice and migration of phagocytes were observed. For the migration of phagocytes, the effects of exposure to NO2 alone were not observed. Migration was decreased when the mice were exposed to both NO2 and x-rays. This seemed to indicate the synergistic action of x-ray and NO2 exposure. A decrease in the weight of mice also indicated a synergistic action.

13137 APTIC NO. 30648

Japan Public Health Assoc.

REPORT ON STUDIES CONCERNING THE METHODS OF QUALIFYING THE RELIEF AIDS RECEIVORS WHO ARE EFFECTED BY ENVIRONMENTAL POLLUTIONS.

(Kogaihikyusaisha no ninteihoho ni kansuru kenkyu hokokusho). Text in Japanese. 134p., March 1969.

The problems of qualifying Itai-Itai disease, caused by polluted water in Toyama prefecture, and the chronic unspecific respiratory diseases, caused by polluted air in Yokkaichi city, are discussed. A proper method is discussed to quality the diseases due to environmental pollution. When qualifying chronic unspecific respiratory diseases as the result of environmental pollution, the area and period of residence based on epidemiological facts should be limited to prove the relationship between the disease and the cause. Three problems are noted concerning the qualification method of Itai-Itai disease. The problems of the method of qualification of Yokkaichi-city and several reform measures are discussed, such as filing procedures and close examination by submitting the prescribed medical examination report at the time of filing. An agency for qualification was established. Its function is to provide advice and suggestions as requested by the Governor, and to decide if the applicants are qualified to receive aid. Its chief duty is to exclude those cases that are not qualified, as the disease is obviously not caused by regional atmospheric pollution, judging from the present symptoms, the medical history, age, history of occupation, and history of residence. For the sake of supervision it is necessary to prepare renewal papers each year to prove qualified patients. Reference material is provided concerning the methods to qualify effected patients by environmental pollutant.

13138 APTIC NO. 30654

Ministry of Health and Welfare, Tokyo (Japan) and Osaka Prefectural Government (Japan)

INVESTIGATION ON THE INFLUENCE OF SMOKE AND SOOT DUST AND OTHERS IN 1967.

(Shows 42-nendo baiento eikyo chosa). Text in Japanese. 171p., 1968 (?).

The influence of atmospheric pollution on school children was investigated. An elementary school in Osaka City was selected to represent a polluted area and an elementary school in Ikeda City was selected as the control school. A total of 528 children of the fourth and sixth grades from both schools were the subjects of the investigation. To have medical and otorhinolaryngological examinations three times a year, and to examine the relationship between the daily change of pollution and that of respiratory functions, investigations were made for five successive days. The amount of floating dust and sulfur dioxide in the air was measured since the day before the examination began. Three days prior to the examination, questionnaires were distributed and absences were noted. The parents of the children in the polluted area were mostly blue-collar workers, and those of the children in the contrasting school were mostly white-collar workers. A high rate of conjunctivitis and trachoma was observed among the children in the polluted area. No difference was found in absences. A high rate of sore throats, headache, and coughs was observed among the children in the polluted area. Concerning height and weight, the children in the polluted area were inferior, but no difference was found in growth rate. The examination of respiratory function, by means of a Vitalor, indicated no significant difference between groups of the same height. The examination of vital capacity showed no difference for one second; but children in the polluted area had lower capacity for 0.75 and 0.5 sec. The children of the polluted area showed an obviously lower rate of breathing capacity. The value of respiratory resistance showed a noticeable difference between the same grade children. The over-all five-day examination, however, showed no distinctive difference between the two groups.

13139 APTIC NO. 30671

Yokohama Municipal Univ. (Japan), Dept. of Hygiene and Yokohama Municipal Office (Japan), Center for Public Nuisance

REPORT OF INVESTIGATING LEAD COMPOUNDS IN AUTOMOBILE EXHAUST GASES. *(Jidosha haikigasu chu no namari kagobutsu ni kansura kenkyu hokokusho). Text in Japanese. 80p., 1968 (?).*

Rats, rabbits, and mice were exposed to automobile exhaust gases, which were diluted to a carbon monoxide concentration of 20-30 ppm, for three hours a day, six days a week. The experimental period was 80 to 500 days in length. The results did not show any chronic influences of exhaust gases on growth, volume of exercise, reproduction capacity, or growth of newborn animals. However, a positive impression was found in the pulse of rabbits and learning capacity of rats at the time of exposure. Rabbits were injected with hypodermic dilutions of an anti-knock agent; their reactions to the lead compounds contained in the agent were observed. The reaction to tetramethyl lead or mixed alkyl lead was greater than that to tetraethyl lead. The relationship between the quantity of lead in the environment and the traffic volume of Yokohama City was also studied. No relationship was seen between the quantity of lead in river and well water and traffic volume. However, the amount of lead in the air and on the leaves of trees expressed the traffic volume.

13140 APTIC NO. 30672

Yokohama Municipal Univ. (Japan), Dept. of Hygiene

RESEARCH ON INFLUENCES OF AUTOMOBILE EXHAUST GASES ON HUMAN BODIES. *(Jidosha haikigasu no Jintai ni oyobosu eikyo ni kansuru kenkyu). Text in Japanese. 30p., April 1969.*

The influences of low-density lead on the human body were investigated from an aspect of lead accumulation in the organs. Exhaust gases, in which the carbon monoxide concentration was diluted to 75 ppm, were repeatedly exposed to light rays. The inhalation period was three hours a day, five days a week, and the experimental period was from 30 days to 240 days. Significant influences of exposure to exhaust gases were not found in the blood. The accumulation of lead in the blood and liver was clearly determined. In other organs, a significant accumulation of lead was not observed. Although precipitation of lead in the bones was seen in some cases, on the whole, the results did not indicate a correlation with exposure to exhaust gases. The quantity of lead in elementary school children's teeth was investigated in polluted areas, unpolluted areas, and intermediate areas of Kanagawa prefecture. A connection was found, to a certain degree, between the quantity of lead in the teeth and the degree of air pollution. The quantity of lead in the urine of persons handling lead-additive gasoline and the quantity of coproporphyrin in the urine were investigated. Repeated experiments of exposure to lead-additive gasoline were also made using rats. Possible influences of lead were found in the experimental animals, but for persons handling gasoline, no influences were seen. The problems which are caused by the lead of automobile exhaust gases were not found in the present environment. It was suggested however, that its influences should not be ignored, depending on the air pollution situation.

13141 APTIC NO. 30682

BERYLLIUM - HAZARDOUS AIR POLLUTANT. *Environ. Sci. Technol., 5(7):584-585, July 1971.*

The health hazards, sources, and control measures associated with beryllium are discussed. Beryllium usually enters the body through inhalation and absorption through the lungs. The respiratory effects may be acute or chronic. Acute beryllium disease inflames the respiratory tract from nose to lungs, causing bronchitis, tracheitis, and chemical pneumonitis. The more common insidious type appears after recurring exposure to relatively high concentrations. The fulminating illness is evident after a brief and more intense exposure to beryllium. Chronic beryllium disease follows more prolonged exposure to lower concentrations. It has a latent period which may range from a few months to 30 years. These diseases have been traced to most forms of beryllium, except the ore beryl itself. Principle airborne exposure occurs in mining, extracting, and refining beryllium. Beryllium oxide dusts and fumes can be emitted in the copper-beryllium alloying process. Finely powdered metallic-beryllium is used as an additive in rocket fuels, which can lead to possible hazards. When effective control measures are applied to emission sources, beryllium concentrations in the atmosphere are reduced below a harmful level. For wet chemical processes, scrubbers, packed towers, organic wet collectors, and wet cyclones are effective. In dry operations, bag filters, electrostatic precipitators, cyclones, and filter units have been effectively used.

13142 APTIC NO. 30827

Anderson, W. A. D.

CLASSIFICATION OF HUMAN LUNG TUMORS. *National Cancer Inst., Bethesda, Md., and Atomic Energy Commission, Washington, D. C., Proc. Conf. Morphol. Exptl. Respirat. Carcinogenesis, Gatlinburg, Tenn., 1970, p. 83-91. 26 refs. (May 13-16.)*

Classification of human lung cancer is a tool which must be used in any significant study of this disease. To be useful, a classification must be standarized, meaningful, reproducible, and commonly understood and adopted. Both simplified and sophisticated systems may be used for different purposes. The classification systems proposed by the World Health Organization, the International Union Against Cancer, and the American Joint Committee on Cancer Staging and End Results Reporting are presented and discussed. There are several types of pulmonary cancers with distinctive characters that may influence classification. These include: hilar and peripheral lung cancer, giant cell carcinoma, pulmonary blastoma, and early cancer and tumorlets. Hormone production by lung tumors and immunological changes in lung cancer are also discussed. (Author abstract modified)

13143 APTIC NO. 30678

Behrman, Richard E., David E. Fisher, and John Paton

AIR POLLUTION IN NURSERIES: CORRELATION WITH A DECREASE IN OXYGEN-CARRYING CAPACITY OF HEMOGLOBIN. *J. Pediat., 78(6): 1050-1054, June 1971. 19 refs.*

The relationship between the oxygen-carrying capacity of hemoglobin and the degree of air pollution was investigated in 25 newborn infants. Heparinized venous blood was obtained each morning from infants in the nursery during their first four days of life. The oxygen capacity of hemoglobin was determined by gas chromatography; the hemoglobin concentration was determined by spectrophotometry. Pollution was estimated from daily carbon monoxide concentrations obtained at a city monitoring station; this was used as an index of the general air pollution level. The measured oxygen-carrying capacity in the infants was more than two percent lower than the oxygen-carrying capacity of hemoglobin derived from the hemoglobin concentrations. When the environmental CO level was greater than 20 ppm, thy decrease in the oxygen carrying capacity was significantly greater than when the CO level of air was 5 to 20 ppm. At the same CO level, the older infants, who had been breathing nursery air for the longest time, had a greater decrease in oxygen-carrying capacity. The decrease did not correlate with a history of maternal smoking or with the concentration of serum bilirubin in these infants. These observations suggest the need to study the pattern of air pollution in different patient areas within a hospital, and the effects of pollutants on the transport of oxygen in the blood.

13144 APTIC NO. 30762

Berg, J. W.

EPIDEMIOLOGY OF THE DIFFERENT HISTOLOGIC TYPES OF LUNG CANCER. *National Cancer Inst., Bethesda, Md., and Atomic Energy Commission, Washington, D. C., Proc. Conf. Morphol. Exptl. Respirat. Carcinogenesis, Gatlinburg, Tenn., 1970. p. 93-104. 41 refs. (May 13-16.)*

NTIS: CONF-700501

The several types of lung cancer show different epidemiologic patterns of occurrence. Generally, the prime carcinogen comes from cigarettes, and the lung cancers are mostly the types produced by smoking. Industrially exposed individuals may be most prone to develop squamous cell carcinoma, oat cell carcinoma, or adenocarcinoma, depending on the stimulus. Bronchiolar carcinoma is prominent among scar cancers and incidental cancers found at autopsy. (Author abstract modified)

13145 APTIC NO. 30433

Bloch, Winston N., Frederick J. Miller, and Trent R. Lewis

PULMONARY HYPERTENSION IN DOGS EXPOSED TO OZONE. *Preprint, Air Pollution Control Office, Cincinnati, Ohio, Biological Research Branch, 10p., 1971 (?). 11 refs.*

The effects of ozone exposure on pulmonary artery pressure, an index of pulmonary vascular sufficiency, were determined. Six month-old female beagles were used. Forty-eight dogs were randomly divided into six groups of eight each for treatment under one of the following: seven-day-a-week exposure regimens: ozone, one ppm for eight hr/day; one ppm for 16 hrs/day; one ppm for 24 hrs/day; two ppm for eight hrs/day; three ppm for eight hrs/day and filtered conditioned ambient air. Seventeen months of daily ozone exposure resulted in significant mean pulmonary artery (PA) hypertension in three dogs, and excessive systollic PA pressure in nine dogs. Since there was no proportional relationship between ozone exposure and PA hypertension, it was suggested that the occurrence of PA hypertension results from an interaction between ozone exposure and genetic susceptibility. (Author abstract modified)

13146 APTIC NO. 30157

Boudik F., J. R. Goldsmith, V. Teichman, and P.-C. Kaufmann

EPIDEMIOLOGY OF CHRONIC BRONCHITIS IN PRAGUE. *Bull. World Health Organ. (Geneva), 42(5):711-722, 1970. 23 refs.*

From November 1964 to July 1965, a survey on the prevelance of chronic bronchitis and of factors important in its etiology was conducted in Prague among 8292 men aged 50-65 years. The investigations utilized the British Medical Research Council Committee s questionnaire relative to subjective respiratory systems, lung radiographs, and pulmonary function tests. In general, the findings of other epidemiological studies were confirmed: respiratory symptoms occurred more frequently among cigarette smokers, for whom values of the pulmonary function tests were lower even in the absence of symptoms. The rate of occurrence of respiratory symptoms also increased with age. An association between socio-economic category and symptom prevalence was demonstrated, chronic bronchitis occurring more often among manual workers than white collar workers. In addition, the study uncovered an apparent relationship between the occurrence of respiratory symptoms and a family history of chronic bronchitis and tuberculosis, suggesting that future surveys should include studies of familial aggregations of chronic respiratory disease. Prague is observed to have a sulfur dioxide pollution averaging about 0.2 mg/cu m and 0.5 mg/cu m of pollutant particles.

13147 APTIC NO. 30465

Bouhuys, Arend

PULMONARY FUNCTION MEASUREMENTS IN EPIDEMIOLOGICAL STUDIES. *Bull. Physio-Pathol. Respir. (Nancy), vol. 6:561-578, July-Sept. 1970. 24 refs.*

The choice of pulmonary function test in epidemiological studies of respiratory disease has too often been determined by convenience or a desire to test new equipment. Field studies of byssinosis in textile industry are reviewed to illustrate the proper use of lung function tests and the type of information they provide. Interpretation of forced expiratory volume (0.75 sec and one sec) curves and maximum expiratory flow volume curves is discussed. Both the frequency-dependence of compliance and the maximum expiratory flow rates on the effort-independent portion of MEF curves are noted to be sensitive indices of airways obstruction. Moreover, in studies of byssinosis, recordings of maximum flow rates on MEFV curves are a more objective test than FEV one-sec measurements. However, the acute effect of textile dust during a singleday s exposure can be measured by recording either curve. Suggestions are made for future studies of obstructive lung discase and a simple pulmonary test, based on the byssinosis data, is offered for prevention and control programs in industry.

13148 APTIC NO. 30342

Bourbon, Pierre

EFFECTS OF ATMOSPHERIC POLLUTION ON HEALTH. *(Effets de la pollution atmospherique sur la sante). Text in French. Pollut. Atmos. (Paris), 13(49):10-16, Jan.-March 1971. 5 refs. (Presented at the Colloque juridique et scientifique de Royan, May 14-16, 1970.)*

The function of pollutants are analyzed according to their nature, the individual s defense mechanisms, and the observed health effects. Experiments on animals give rise to a number of problems, including the choice of animal, the conduct of the experiment, the effects investigated, and the extrapolation of the results to the human being. Variable results may be obtained depending on whether the pollutant is toxic or has a specific determined action. Epidemiological investigations arise from the exploitation of three types of effects: immediate health effects, effects with seasonal variations, and effects from prolonged exposure. The results obtained from such studies are analyzed. A Dutch method which enables a better analysis of the results is mentioned. Air quality criteria are proposed, but it is noted that ecological conditions will have to be taken into consideration. Acid smogs, sulfur dioxide, irritations, smogs, and oxidants can cause cancer, respiratory diseases, and other health impairments.

13149 APTIC NO. 30381

Chen, Cheetung, Kazuya Okamoto, and Taichi Nakajima

HISTOPATHOLOGICAL STUDIES ON MICE CONTINUOUSLY EXPOSED TO CARBON MONOXIDE. I. THE BRAIN AND THE LUNG. *(Issankatanso renzokubakuromausu no byori-soshikigakuteki kenkyu. I. No oyobi hai ni tsuite). Text in Japanese. Osaka-furitsu Koshu Eisei Kenkyusho Kenkyu Hokoku, Rodo Eisei-Hen (Proc., Osaka Public Health Inst., Ed. Ind. Health), no. 8:29-32, Sept. 1970. 5 refs. (Presented at the Japan Society for Hygiene, Annual Meeting, 40th, 1970.)*

To clarify the minimum carbon monoxide concentration that causes nerve cell degeneration, mice were exposed to 600 ppm, 100 ppm, and 50 ppm CO for one month. With 600 ppm, CO degeneration and atrophy of the nerve cells were observed. Marked changes were observed in the brain exposed to 600 ppm CO. Congestion was observed in the meninx and cerebral parenchyma. Marked degeneration of the nerve cells was observed in the cerebral cortex, lentiform nucleus, Ammon s horn, and the Purkinje cells in the cerebellum. Satellitosis was also observed. In the white matter, dilation of the Virchow-Robin space around the blood vessels, separation of the nerve fibers, and spongiose status were seen. Congestion in the brain and degeneration of the nerve cells with exposure to 100 ppm CO were milder than those seen with exposure to 600 ppm CO. In the group exposed to 60 ppm CO, mild congestion was observed in the meninx and the cerebral parenchyma. Degeneration of the nerve cells was only rarely observed in the pyramid cell, the cerebral cortex, and the Purkinje s cells. Congestion was most markedly observed in the lung, and the severity increased in order of increasing concentration, i.e., 600, 100, and 50 ppm. The occurrence of pulmonary congestion with the exposure to CO of 50 ppm has never been known. This suggested that CO in low concentrations has some effect on the central nervous system, the ECG, and other areas. The maximum allowable concentration for Japanese industrial workers is 100 ppm CO.

13150 APTIC NO. 30216

Cranston, Russell D. and Roger P. Smith

SOME ASPECTS OF THE REACTIONS BETWEEN HYDROXYLAMINE AND HEMOGLOBIN DERIVATIVES. *J. Pharmacol. Exp. Therap., 177(2):440-446, 1971. 17 refs.*

Recent evidence indicates that nitrite and unsubstituted hydroxylamine are not toxicologically equivalent forms in vivo. Hydroxylamine has effects on red cell metabolism which are not shared by nitrite. It has a greater tendency to generate sulfhemoglobin-like pigments and Heinz bodies in the red cells of certain mammals than do equal concentrations of nitrite. It is also not clear whether sulfhemoglobin and Heinz body formation are due to the metabolic effects of hydroxylamine or to some fundamental difference between it and nitrite in the mechanisms of their reactions with hemoglobin. Heinz body formation by certain aberrant hemoglobins seems to be triggered by a dissociation of the heme group from the globin moiety. When nitrite, hydroxylamine, and ferricyanide were tested for their ability to elicit specific heme loss, only ferricyanide had a statistically significant effect. However, all three reagents produced a total hemoglobin loss relative to control preparations of oxyhemoglobin. Ferricyanide and hydroxylamine convert deoxyhemoglobin to methemoglobin; deoxyhemoglobin is resistant to nitrite. Hydroxylamine converts some oxyhemoglobin to methemoglobin, but sulfhemoglobin-like pigments are also formed. The heme oxygen is released in the hydroxylamine-oxyhemoglobin reaction, but this effect is masked by the oxidative decomposition of hydroxylamine. (Author abstract modified)

13151 APTIC NO. 30854

Crocker, T. T., J. E. Chase, S. A. Wells, and L. L. Nunes

PRELIMINARY REPORT ON EXPERIMENTAL SQUAMOUS CARCINOMA OF THE LUNG IN HAMSTERS AND IN PRIMATE (GALAGO CRASSICAUDATUS). *National Cancer Inst., Bethesda, Md. and Atomic Energy Commission, Washington, D. C., Proc. Conf. Morphol. Exptl. Respirat. Carcinogenesis, Gatlinburg, Tenn., 1970, p. 317-328. 7 refs. (May 13-16.)*

NTIS: CONF-700501

An experiment is in progress to test whether intratracheal instillation of benzo(a)pyrene (BP) combined with an equal weight of powdered ferric oxide produces comparable lesions and neoplasms in a primate (Galago crassicaudatus panengiensis, a member of the suborder Prosimii) and in the hamster. Six galagos 11 to 16 weeks old (infants) and 30 male hamsters 11 weeks old (young adults) received weekly tracheal instillations of 3 mg (hamsters) or three to 15 mg (galagos) of BP for 14 weeks. Hamsters were not treated thereafter, but galagos were continued except when evidence of bone marrow toxicity has required omission of treatment for one to three weeks. Seven hamsters died during the 14-week treatment period due to mediastinitis, pneumonitis, or anesthetic overdose, and 19 died between 29 and 74 weeks of the experiments. All of the latter group had zones of bronchiolar alveolar metaplasia. Five had squamous carcinoma, three had adenocarcinoma, and one had anaplastic carcinoma invasive of trachea, major bronchi, or lung. Squamous metaplasia of bronchial epithelium, either in bronchi or in sites of bronchiolar alveolar metaplasia, was not observed. – Three galagos died after 67 to 69 weeks of treatment. All had zones of alveolar bronchial metaplasia, and in many of these zones ciliated columnar epithelium was replaced by squamous epithelium. Two galagos had squamous carcinomas arising from a bronchus, from squamous cells in zones of bronchiolar alveolar metaplasia, or, in one animal, possibly from both sources, with coalescence of squamous lesions; this process obscured any single site of origin of the terminal neoplasm. Thus, squamous carcinoma of the lung of a primate has been produced by a method which also produces this lesion in hamster lungs. (Author abstract)

13152 APTIC NO. 30440

Cuddihy, R. G. and W. C. Griffith

TISSUE DISTRIBUTION AND RETENTION OF 140 BA AND 140 LA IN BEAGLE DOGS AFTER INALATION OF BACL2-LACL3 AEROSOLS. (ANNUAL REPORT). *Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex., Fission Product Inhalation Program, AEC Contract AT(29-2)-1013, p. 92-99, Nov. 1970. 5 refs.*

NTIS: LF-43

The tissue distribution and retention of 140 barium and 140 lanthanum were studied in Beagle dogs after they inhaled aerosols containing 140 barium cloride and 140 lanthanum cloride. About 60% of the 140 La deposited in the respiratory tract was retained in the lung with an effective half life approaching the physical half life of 140 La, and it contributed a major dose of radiation to the lung tissue. The 140 Ba was rapidly translocated to the skeleton where radioactive equilibrium with 140 La was attained within 15 days and persisted for the 64 day duration of the study. Average beta radiation doses to lung tissue and skeletons were estimated to be about 21 and 17 Rad, respectively, for the inhaled initial body burden of 100 micron Ci of 140 Ba and 100 micron Ci of 140 La. The liver, skeleton, muscle, and nasal tissues also received large amounts of 140 La. Urine, tissues, feces, and blood samples were analyzed. (Author abstract modified)

13153 APTIC NO. 30333

Dodo, Hidenori, Hitoshi Hasegawa, and Kamezo Ueki

AIR POLLUTION IN OTAKE CITY. (REPORT 10). *(Otake-shi no taikiosen ni tsuite. (Dai 10 po). Text in Japanese. Hiroshima Daigaku Igaku Zasshi (Med. J. Hiroshima Univ.), 18(5/6):311-316, June 1970. 12 refs.*

During October and November 1970, lung function tests were performed on children from Otake Primary School, located in an area of relatively intense air pollution, and on children from two primary schools, Kuba and Ogata, in relatively unpolluted areas of Otake. Of the 1410 children examined, 770 had been previously tested in February 1970. Daily sulfur trioxide rates are given. Average values of vital capacity/body height, together with standard deviations, were highest for the Otake Primary School children--with the exceptions of sixth-grade boys and fourth-grade girls. Average spirogram results and maximal expiratory flow rates were also significantly higher for these children than for those in the other districts, again with the same exceptions. These findings differed from those of three previous surveys. They are considered to reflect not only changing trends in air pollution in the three areas, but also human adaptation to the environment. (Author abstract modified)

13154 APTIC NO. 30265

Dontenwill, W., H. J. Chevalier, U. Lafrenz, and G. Reckzeh

EXPERIMENTAL STUDIES ON THE EFFECT OF INITIAL DOSES OF DMBA ON THE RESPIRATORY TRACT OF SYRIAN GOLDEN HAMSTERS. *(Experimentelle Untersuchungen ueber die Wirkung von Initialdosen von DMBA auf den Atemtrakt des syrischen Goldhamsters). Text in German. Z. Krebsforsch., vol. 73: 248-250, 1970. 5 refs.*

Five hundred gamma 9,10- dimethyl - 1,2 - benzanthracene suspended in CMC led to papillomas of the larynx in 5% of the treated hamsters. It also caused adenamotoid lesions in 46% of the treated animals. This experimental model appears adequate for the initial treatment of the respiratory tract with carcinogenic substances. Further tests with the same technique are being conducted to study the suitability of the method for testing weak carcinogenic and cocarcinogenic substances on the respiratory tract.

13155 APTIC NO. 30788

Fournier, P.

AIR POLLUTION AND ITS ROLE IN RESPIRATORY PATHOLOGY. *(Les pollutions atmospheriques et leur role en pathologie respiratoire). Text in French. Sem. Ther., 47(4):395-398, April 1971.*

The sources of air pollution are manifold: fumes from domestic and industrial combustion, industrial residues, exhaust gases from automotive vehicles, dust generated by road traffic, and the always present dust particles created by erosion and disintegration of animal and vegetable organic matter. It is estimated that in the city area of Paris, 50% of air pollutants emanate from home heating, 25% from industrial waste, and 25% from automobile exhaust gases. Chemically, the most analyzed pollutants are mineral and organic dust varieties, gases and vapors, particularly sulfurous anhydride, nitric oxide, fluorine compounds, ozone, and aromatic hydrocarbons. Also mentioned should be, from the point of view of noxiousness, atmospheric allergens, bacteria, viruses, and fungi, all of which can affect the human broncho-pulmonary system. Symptoms of the effect of inhaling gaseous pollutants in substantial concentration can be, in the lung area, edemata, hemorrhages, distention and rupture of alveoli; in the bronchial area, erosion of the epithelium, edema, and hemorrhage. Prolonged inhalation of air containing gaseous pollutants in lesser concentrations can induce progressive sclerosis of the alveolic walls and ensuing development of emphysema, bronchial lesions causing dilatation or spasms, and hypersecretion of mucus. The effect of the weather in the Meuse valley in 1930, and in Donora, U.S.A., in 1948 is mentioned; both are industrial areas located in valleys where, due to a temperature inversion with extended absence of wind, extremely high concentrations of pollutants, particularly sulfur dioxide, accumulated. Forty-three percent of the population of Donora was afflicted by respiratory troubles; in the Meuse valley, the number of deaths attributed to this occurrence was ten times the statistical average of the preceding years.

13156 APTIC NO. 30385

Gerdes, Raymond A., James D. Smith, and Howard G. Applegate

THE EFFECTS OF ATMOSPHERIC HYDROGEN FLUORIDE UPON DROSOPHILA MELANOGASTER - II. FECUNDITY, HATCHABILITY, AND FERTILITY. *Atmos. Environ. (London), 5(3):117-122, March 1971. 2 refs.*

Two strains of Drosophila melanogaster were treated with sublethal levels of gaseous hydrogen fluoride for six weeks. Egg samples were collected at various times for hatchability determinations. Adults reared from these samples were evaluated for fecundity and fertility. Treatment with HF caused a marked reduction in hatchability and fecundity in the more sensitive strain. Male fertility was depressed, but female fertility remained stable over the test period. The reduction of these parameters in the offspring of populations subjected to low levels of atmospheric HF pollution for prolonged periods suggests that HF causes genetic damage. (Author abstract modified)

13157 APTIC NO. 30387

Gerdes, Raymond A., James D. Smith, and Howard G. Applegate

THE EFFECTS OF ATMOSPHERIC HYDROGEN FLUORIDE UPON DROSOPHILA MELANOGASTER - I. DIFFERENTIAL GENOTYPIC RESPONSE. *Atmos. Environ. (London), 5(3):113-116, March 1971. 4 refs.*

Four inbred lines of Drosophila melanogaster were exposed to various concentrations of gaseous hydrogen fluoride for a period of six weeks. At all treatment levels the populations responded similarly during the first 12 hours with few deaths occurring. However, during the second 12 hours it was apparent tht the 5.5 ppm HF level was harmful. By the end of the third day all flies subjected to this treatment were dead. At 4.2 ppm a definite difference in the response of the different strains existed. A different mechanism is involved with the three reduced concentrations than that displayed at 5.5 ppm. At the higher concentration a directly deleterious effect is noted, while at the reduced levels a genetic effect is indicated by the different genotypic responses. The effects on viability were predominantly linear with respect to fluoride concentration over the ranges tested. The differential responses of the inbred lines were interpreted to mean that tolerance to fluoride contamination is influenced by genotype. (Author abstract modified)

13158 APTIC NO. 30196

Gil, Joan

ULTRASTRUCTURE OF LUNG FIXED UNDER PHYSIOLOGICALLY DEFINED CONDITIONS. *Arch. Internal Med., 127(5):896-902, May 1971. 15 refs. (Presented at the Hanford Biology Symposium on Pollution and Lung Biochemistry, 10th Annual, Richland, Wash., June 3, 1970.)*

Morphological work dealing with correlation between structure and function necessitates careful fixation techniques to ensure preservation of the lung under well defined, nearly physiological conditions. The problems, merits, and disadvantages of two techniques--fixation from the front by installation of fixatives into airways, and fixation from behind by vascular perfusion into the pulmonary artery--are discussed. Perfusion-fixation is concluded to be the only technique presently available for solving some special problems such as preservation of the alveolar lining layer or alveolar edema, fixation of lungs at different volume histories, or preservation of the fluid lining the airways. This method is particularly useful for studies related to air pollution. Lung surfactant has definite morphological features. Tubular myelin figures may represent surface-active lipoprotein. (Author abstract)

13159 APTIC NO. 30464

Green, Cloid D.

THE TOXICITY OF NITROUS OXIDE. (CHAPTER 3). *Clin. Anesth., vol. 1:37-44, 1964. 25 refs.*

Studies by various investigators of possible toxic manifestations of prolonged nitrous oxide inhalation are summarized. Cell studies and molds have been used in in-vitro systems to extend findings that N20 will depress the bone marrow and the peripheral white-cell counts after prolonged administration. The depressant effects of the gas have been utilized in the treatment of leukemia, but no evidence is available to show that life was prolonged. The analgesic properties were most useful. There is no evidence that any toxic property of N20 becomes manifest during its use as an anesthetic agent in less than 48 hrs or that any alteration is necessary in the use of N2O as an anesthetic for surgical procedures. (Author summary modified)

13160 APTIC NO. 30468

Grieco, B., R. Pennarola, and P. Lamanna

HYSTO-AUTORADIOGRAPHIC STUDY OF THE DISTRIBUTION OF RADIOACTIVE LEAD (PB210) IN VARIOUS ORGANS OF RATS. *(Studio istoautoradiografico sulla distribuzione del piombo radioattivo (Pb210) in diversi organi del ratto). Folia Med. (Naples), vol. 49:937-947, 1966. 8 refs. Translated from Italian, 12p.*

The organs of rats injected with a radioactive lead isotope were studied by hystoautoradiographic techniques to determine cellular localization of the lead. Organ sections prepared on demonstration slides were spread with photographic fluid using the stripping method. After 30-45 days in which the fluid was exposed to the radiation emitted from the hystologic cross sections, the slides were developed and colored, and later washed. Results confirmed the findings of other investigators that lead diffuses rapidly in several organs, principally, in order of preference, in the liver, lungs, kidneys, and spleen. In the first few hours after injection the deposits of the radioisotope are massive. Several of the hystoautoradiographs of the liver suggest a deposition of the metal both inside and outside the cell.

13161 APTIC NO. 30899

Handa, Kazuko and Kazuo Tamura

A SURVEY OF SCHOOLCHILDREN IN THE AIR POLLUTION AREA IN WAKAYAMA CITY. *(Taiki osen ichi gakudo no kenko kanri ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):142, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, Tokyo, Japan, 1970.)*

Records were made for 12 months starting in April 1969 on the health of school children in Wakayama city. History of respiratory disease, lung function, indirect photography of respiratory organs, progress of illness of children with allergic membrane on respiratory tract, and school attendance records were carefully examined. Absence of other diseases showed no specially different pattern in polluted areas. But an area which had a high concentration of pollution in January showed a high ratio of absence from respiratory irregularities. The second highest absence ratio was in the area where factories had been expanded recently. In winter, more chronic bronchitis and laryngitis cases were reported in polluted areas than in other others.

13162 APTIC NO. 30147

Heyder, Joachim

CONDITIONS FOR DETERMINATION OF THE DEPOSITION OF AEROSOL PARTICLES IN THE HUMAN RESPIRATORY TRACT. *(Bedingungen zur Bestimmung der Deposition von Aerosolteilchen im menschlichen Atemtrakt). Text in German. Staub, Reinhaltung Luft, 31(5):193-196, May 1971. 2 refs.*

Deposition is defined as the probability with which an aerosol particle will be deposited in the human respiratory tract upon inhalation. The experimental determination of the deposition requires an aerosol containing identical particles of constant concentration in the inhaled air. Particle diameter, density, charge, and the functional reserve capacity must be constant during the inhalation experiments. The breathing volume must be a periodical function of time, and steady state conditions are necessary. Steady state means that the average concentration of particles in the exhaled air is constant for every breath. The deposition is reproducible for the subject only if all these requirements are fulfilled. Theoretical determinations of deposition are given. (Author abstract modified)

13163 APTIC NO. 308480

Hickey, Richard J., David E. Boyce, Evelyn B. Harner, and Richard C. Clelland

ECOLOGICAL STATISTICAL STUDIES ON ENVIRONMENTAL POLLUTION AND CHRONIC DISEASE IN METROPOLITAN AREAS OF THE UNITED STATES. *Regional Science Research Inst., Philadelphia, Pa., APCO Research Grant AP-00556, Paper-35, 111p., Oct. 1970. 150 refs.*

The results of ecologically oriented statistical analyses of data on air pollutants and chronic disease mortality of populations in metropolitan areas were presented, and the possibility of their direct relationship via radiomimetic mechanisms to alterations of DNA base sequences in both somatic and germinal cells was discussed. Certain environmental chemicals are significant statistical predictors for mortality rates in certain cancer and heart disease categories, for congenital malformations, for total deaths in one year, for median age, and for bith rates. Atmospheric concentrations of sulfur dioxide and nitrogen dioxide are recurring predictors of mortality rates in certain cancer and heart disease categories. The statistical studies were not inconsistent with the concept of senescence or a general cumulative somatic genetic disease or with the concept of specific chronic disease categories. A high degree of intercorrelation exists between the mortality rates for different cancers and that for heart disease. This would be consistent with a similar etiology for these diseases. A number of environmental metals were found to be negatively correlated with the mortality rate for cancers and heart disease. This is suggestive of protective or preventive action. It is hypothesized that some or much of this effect might be accounted for by chelation of the metals with the primary amine groups of the DNA bases so that deamination by nitrous acid will be suppressed or prevented. (Author summary modified)

13164 APTIC NO. 30807

Ishinishi, Noboru and Yoko Katori

METABOLISM OF BENZO(A)PYRENE IN THE LUNGS OF RAT. *(Ratto hai ni okeru Benzo(a)pyrene taisha ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):151, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, Tokyo, Japan, 1970.)*

Benzo(a)pyrene, a potential carcinogen was observed in rat lungs; its quantity and speed of metabolism were examined. Mature male rats were anesthetized, and their superior vocal cords (vestibular ligament) were observed while controlling the secretion of bronchial mucus with 0.5% sulfuric acid atropine and pouring in 1000 gamma/0.075 ml PEG solution and 1000 gamma B(a)P plus dust 1 mg/0.075 ml PEG solution with special needle tubes. A microscopic study of a frozen fragment of lung was made and B(a)P metabolic material in lungs was analyzed. As a result, B(a)P and dust particles stayed in lungs for six to 12 hours, but left no trace in 24 hours. The B(a)P permiated the alveolar wall of the lungs from the alveolus. The B(a)P content of plasma rose immediately after the treatment, but it stayed approximately at the same level after that. The metabolized material was 4-5 dihydro; 4-5 dihydroxy, 6 hydroxy; 3 hydro; 2-3 dihydro; and 2-3 dihydroxy B(a)p in that order. It was concluded that B(a)P poured into lungs metabolized within a relatively short time.

13165 APTIC NO. 30240

Kalacic, I.

CHRONIC BRONCHITIS AND VENTILATORY LUNG FUNCTION IN SMOKERS AND NONSMOKERS. *(Kronicni bronhitis i ventilacijska funkcija pluca u pusaca i nepusaca). Text in Yugoslavian. Archiv. Hig. Rada, Toksikol (Yugoslavia), 21(1):5-12, 1970. 36 refs.*

In 710 workers who had not been exposed to occupational respiratory toxins, the relationship between cigarette smoking, chronic bronchitis, and ventilatory lung function was studied. The British Medical Research Council s questionnaire was used and ventilatory lung function tests were performed with a waterless spirometer. With regard to smoking habits, the workers were classified as nonsmokers, exsmokers, or present 0smokers. The smokers were categorized as light, moderate, or heavy. The results showed that the prevalence of chronic bronchitis was higher in smokers than in nonsmokers. There was a direct relationship between the number of cigarettes smoked during the lifetime and the occurrence of chronic bronchitis. Vital capacity was lower in heavy smokers than in nonsmokers. The forced expiratory volume/forced vital capacity ratio was lower in smokers than nonsmokers, but the difference was not statistically significant. The expiratory flow rate during the third quarter of forced vital capacity was lower in smokers. A causal relationship is believed to exist between cigarette smoking and chronic bronchitis and the impairment of ventilatory lung function. (Author summary modified)

13166 APTIC NO. 30681

Kilburn, Kaye H. and Anthony R. Dowell

CONNECTIVE TISSUE OF THE LUNG. *Arch. Internal Med., 127(5): 845-846, May 1971. 2 refs.*

Emphysema and pulmonary fibrosis are chronic lung diseases which are increasing in prevalence. There is evidence that they are two of a limited number of responses which the lung can make to environmental agents. Loss or redistribution of connective tissue in the alveolar interstitial space and proliferation of the interstitial connective tissue appear to be the only responses of pulmonary connective tissue which are measurable. A model for proliferation of connective tissue would be useful. Particles of silica, asbestos, and beryllium stimulate fibrosis, and traumatic wounds of the lung heal as scars. Occlusion of a pulmonary artery stimulates protein synthesis, as does papain deposition in alveoli. Therefore, it is not surprising that many chemical agents, including oxygen and ionizing radiation, are associated with fibrosis. A general concept of pulmonary fibrogenesis and involution is needed, which will permit predictions to be made as to the probability of cell differentiation favoring the occurrence of fibrosis during or after alveolar injury. Identification of reticulum fibers by morphologic and chemical methods is needed to explore the integrity preserving activities of the lung. It is impossible to draw conclusions about mechanisms of human alveolar disease from the present efforts to identify the behavior and properties of the connective tissue component in the alveoli by biochemical and morphological methods. The development of models for alveolar destruction and the correlation of anatomical and biochemical data should stimulate other investigators into this important area.

13167 APTIC NO. 30743

Krueger, Albert P. and Sadao Kotaka

THE EFFECT OF AIR IONS ON EXPERIMENTAL RESPIRATORY INFECTIONS. *Preprint, California Univ., Berkeley, Biomedical Lab. Science Div. and California Univ., Berkeley, Naval Biological Lab., 11p., 1971. 11 refs.*

The influence of air ions on the course of respiratory disease in animals was investigated. Three models of respiratory disease in mice were produced by a fungus, a bacterium, and a virus and were influenced adversely by high concentrations of positive air ions. It was hypothesized that positive ions enhance the death rate because they inhibit the tracheal-bronchial clearing mechanism and, in effect, assure the delivery to the pulmonary parenchyma of a larger amount of fungal, bacterial, or viral suspension than normally would reach that area. In addition, positive ions raise the blood levels of serotonin and render the lung tissue more susceptible to trauma.

13168 APTIC NO. 30394

Kruysse, A., V. J. Feron, and A. M. Verbeek

STUDY OF DAMAGE FROM INHALED SUBSTANCES (INHALATION TOXICITY STUDIES). *(Onderzoek naar de schadelijkheid van ingeademde stoffen (Inhalatietoxiciteitsonderzoek). Text in Dutch. TNO Nieuws, p. 177-182, 1970. 12 refs.*

Inhalation research originated in the 19th century, was revised at the end of World War II as a means of testing the effects of radioactive substances, and was further developed as a means of testing the toxicity of household products such as the various aerosols. In the Netherlands, the Central Institute for Nutrition and Food Research of the TNO is attempting to set standards for such studies. A definition is given of acute, subacute, subchronic, and chronic studies. Using rats as laboratory animals. A uniform climate is maintained (an air exchange of 3500 cu m/hr, a temperature of 22 C, and a relative humidity of 50-60%) by the use of air-conditioning equipment. An air pressure slightly above that of the outside environment is maintained to discourage the influx of alien substances from outside. Two different sets of equipment are used for the short-range and long-range testing. The long-range testing chambers are capable of holding 210 animals. This laboratory has also begun experiments with intratracheal intubation, which involves injecting the substance to be studied for toxicity directly into the respiratory tract of the test animal.

13169 APTIC NO. 30364

Kubo, Seiji

AIR POLLUTION AND INFANTILE RESPIRATORY DISEASES. *(Taikiosen to shoni no kokyukishikkan). Text in Japanese. Nippon Toshi Gakkai Kaishi (J. Japan Soc. Urban Med.), vols. 1-3:43-46, March 1971. (Presented at the Japanese Society of Urban Medicine, Annual Meeting, 3rd, Tokyo, Japan, Oct. 4, 1970.)*

An investigation was made of the primary school children in the cities of Fuji and Fujinomiya of Shizuoka prefecture to reveal the relationship between atmospheric pollution and infantile asthma. The investigated area was divided into three regions, according to daily average concentration of sulfur dioxide: highly contaminated region (A), 0.06 0.07 ppm, medium contaminated region (B), 0.05 ppm, and low contaminated region (C), 0.03 ppm. The investigation was made by a questionnaire, and patients were selected for further examination. From the results it was observed that the occurrence of bronchial asthma in A region was roughly three times that of C region. Occurrence of asthma in the children of C region decreased with their grade in school, but there was no such tendency in A region. The occurrence of allergic diseases in the individual and family, and the increased eosinophiles and aquamans in the sputum cells of individual patients showed no difference when compared with children from the outpatient clinic of the pediatric department of Chiba University. Before the age of two 20-30% of asthmatic patients became ill. Those who had asthma before they moved into Fuji City were questioned to determine the progress of their diseases. It was revealed that the higher the density of pollution the lower the recovery rate. The monthly occurrences of wheezing asthma showed a parallel tendency to the concentration of SO2. Of all children investigated, by examining the relationship between upper respiratory inflammation, especially rhinitis and bronchitis and concentrations of SO2, it was found that upper respiratory disease occurred especially in C region. However, there was more bronchitis in A region and twice as many cases of bronchitis in C region. This reveals that in A and C regions, bronchial infection had spread to the lower respiratory tract.

13170 APTIC NO. 30146

Leiteritz, Hans, Hans-Dieter Bauer, and Erich Bruckmann

CONCENTRATION RATIOS AND MINERAL COMPOSITON OF DUSTS IN WEST GERMAN HARD COAL MINES AND THEIR IMPORTANCE FOR THE DEVELOPMENT DUST LUNGS IN MINERS. *(Konzentrationsverhaeltnisse und mineralische Beschaffenheit der Grubenstaeube im west deutschen Steinkohlenbergbau und ihre Bedeutung fuer die Entwicklung der Staublunge bei Kohlenhauern). Text in German. Staub, Reinhaltung Luft, 31(5):185-189, May 1971. 10 refs.*

In the years 1967 to 1969 extensive studies on the role of minerals in the development of pneumoconioses were conducted. Investigations were made to determine if a relationship existed between the type and quantities of minerals in the suspended dust, primarily between the quartz content and the frequency, severity, and development time of pneumoconioses. Suspended dust samples were taken in eleven coal mines. The mineral concentration was determined by radiography and infrared spectroscopy. The mean dust concentration was 53.1 mg/cu m air, with a standard deviation of plus or minus 29.4 mg/cu m. The quartz fraction was 4.1 mg plus or minus 3.3% by weight. A comparison of these results with the frequency of silicosis found among the miners revealed that a correlation exist between the fine dust concentration and the silicosis frequency. A correlation was also found between the quartz concentration and the silicosis frequency. A higher silicosis frequency is found among miners who work with coal whose fine quartz dust concentration is high.

13171 APTIC NO. 30686

Lepow, Martha

DISCUSSION OF ADVERSE EFFECTS OF INORGANIC LEAD SALTS AS RELATED TO VARIOUS LEVELS OF ABSORPTION OF LEAD. *Conn. Med., 35(6): 353-355, June 1971. 7 refs.*

The biology of lead poisoning is discussed. In man, excessive lead absorption particularly affects the biosynthesis of heme and certain functions of the kidney and brain. The metabolic effects of lead on heme synthesis are reversible when excessive exposure is eliminated, but this is not always the case when there is functional damage to the kidney and/or central nervous system. Acute lead poisoning usually does not occur until the blood lead level exceeds 80 micrograms. In young children, the most important syndrome of acute lead poisoning is acute encephalopathy. Clinical diagnosis depends on a high index of suspicion and laboratory tests, including blood lead concentration and demonstrating adverse metabolic effects in the form of increased output of delta-aminolevulinic acid and coproporphyrin. Acute encephalopathy may be accompanied by urinary aminoaciduria, melituria, and hyperhposphaturia. Chronic encephalopathy may be related to long, continued, excessive absorption of lead. It may aalso occur as a result of recurrent bouts of the acute disease. The treatment consists of chelation therapy and removal of the source. It is estimated that children with encephalopathy have a level intake 250 times greater than normal. Asymptomatic children with increased lead absorption may take in 10 times the normal intake.

13172 APTIC NO. 30680

Lewis, George P., Hugh Lyle, and Stephen Miller

ASSOCIATION BETWEEN ELEVATED HEPATIC WATER-SOLUBLE PROTEIN- BOUND CADMIUM LEVELS AND CHRONIC BRONCHITIS AND/OR EMPHYSEMA. *Lancet, vol. 2:1330-1333, Dec. 20, 1969. 18 refs.*

The cadmium, copper, and iron levels in concentrated water-soluble protein extracts prepared from sixty human liver specimens were estimated. The metals were measured by atomic absorption spectrophotometry. Trace metal levels found in the liver extracts from patients with chronic bronchitis and/or emphysema were compared with the values for patients without these diseases. The mean cadmium level in this group was over three times that found in the remainder. No such difference was seen for copper and iron. The high levels of liver cadmium could be the long-term result of excessive intake. One possible source of increased intake, affecting large sections of the population, is air pollution.

13173 APTIC NO. 30831

Lutz, Garson, Arthur A. Levin, Sanford G. Bloom, Kaj L. Nielsen, Jack L. Cross, and David L. Morrison

TECHNICAL, INTELLIGENCE, AND PROJECT INFORMATION SYSTEM FOR THE ENVIRONMENTAL HEALTH SERVICE (VOLUME III): LEAD MODEL CASE STUDY. (FINAL REPORT). *Battelle Memorial Inst., Columbus, Ohio, EHS Contract CPS-69-005, Rept. CPS-69-005-3, 140p., June 29, 1970. 613 refs.*

NTIS: PB 194 412

A lead model case study was undertaken to serve as a working example and to evaluate the technical, intelligence, and project system under consideration for the Environmental Health Service. Occurrence and use patterns for lead within the U. S. were examined. The major categories of uses in decreasing order were production of storage batteries and accessories, gasoline antiknock additives, pigments, ammunition, solder, cable covering, and caulking lead. Leaded fuels are the major source of environmental lead. Pediatric plumbism, the most significant acute health problem, arises from lead used as a pigment. The economic aspects of this problem were investigated. While lead is very slowly absorbed from environmental sources, its gradual accumulation in the body is the basis for progressive lead toxicity. Additional research is required to determine the chronic effects of lead in the environment on health, and better diagnostic and therapeutic techniques are needed in support of this research. A mathematical model was developed to represent the environmental transport of the stressor lead from several sources with subsequent intake of lead by man. This model can be used to assess the impact of contemplated actions of lead body burdens, to define research and development requirements, and to identify the needs and locations for monitoring and surveillance. A categorized bibliography for lead is included in this report. (Author abstract)

13174 APTIC NO. 30841

MacEwen, J. D. and E. H. Vernot

TOXIC HAZARDS RESEARCH UNIT ANNUAL TECHNICAL REPORT: 1970. *SysteMed Corp., Dayton, Ohio, AF Contract F33615-70-C-1046, Proj. 6302, Task 01, Rept. AMRL-TR-70-77, SysteMed Rept. W-70005, 87p., Aug. 1970. 51 refs.*

NTIS, DDC: AD 714694

The activities of the Toxic Hazards Research Unit for the period of June 1969 through May 1970 are reviewed. Modifications of the animal exposure facilities are discussed including the installation of an automatic weighing system in each Thomas Dome. Acute toxicity experiments were conducted on beta cloth glass fiber dust, chlorinetrifluoride (ClF3), oxygen difluoride, and hydrogen fluoride. There was no evidence of irritation from the beta cloth dust; histopathologic examination of the nasal passages and respiratory airways failed to show any differences between the exposed and the control animals. Lacrimation, salivation, dyspnea, and rhinorrhea were the common symptoms seen in rats and mice exposed to ClF3. Lethal concentrations produced massive alveolar and interstitial hemorrhage. Animals exposed to near lethal concentrations showed congestion, edema, hemorrhage, and emphysema. The signs of HF toxicity were similar to those seen in ClF3 exposures. Massive lung hemorrhage and edema were the characteristic findings in those animals that died during exposure to HF. Respiratory distress was seen in rodents exposed to OF2; in dogs and monkeys, gagging and emesis occurred. All animals that died had lung congestion, edema, and hemorrhage. Subacute toxicity studies were conducted on Freon 113 and methylisobutylketone. The changes observed in animals exposed to Freon 113 were all minimal; there were no signs of toxic response to methylisobutylketone. The interim results of chronic toxicity experiments on monomethylhydrazine are also discussed.

13175 APTIC NO. 30362

Marx, H. H.

EMPHYSEMATOUS BRONCHITIS: MISUNDERSTANDINGS, KNOWLEDGE, AND REQUIREMENTS. *(Die Emphysembronchitis. Missverstaendnisse, Erkenntnisse und Erfordernisse). Text in German. Deut. Med. Wochschr., 96(19):833-838, May 1971. 31 refs.*

Emphysematous bronchitis accounts for 60% of the deaths among pensioners. Health insurance records indicate five million sick days per annum in West Germany because of chronic bronchitis. In England the number is even higher. It has been statistically confirmed that such external factors as air pollution, smoke, dust as well as weather conditions have an important influence on the morbidity of this disease. Cigarette smoking, too, is an important influence. Experimental studies have shown that chronic bronchitis patients react to inhalation of dust-polluted air, cold air, and acetylcholine with an increase of airway resistance. Weather conditions must exert an important influence since the rural population is afflicted with the disease at an even higher rate than the urban population.

Chronic exposure to the mentioned environmental factors caused irreversible changes in tissue and the structure of the alveoli and impairs the elasticity of the lung. At an early stage, the lung ventilation is disturbed through obstruction of the respiratory path. Chronic oxygen deficiency can be measured in-emphysema patients at an early stage.

13176 APTIC NO. 30804

Matsumura, Y. and T. Suzuki

THE EFFECTS OF O3, NO2 and SO2 EXPOSURE ON THE EXPERIMENTAL ASTHMA IN GUINEA PIGS (2). *(Morumotto no jikken zensoku ni oyobosu O3, NO2, oyobi SO2 bakuro no eikyo(dainiho)). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):144, 1970. (Proceddings of the Japan Society of Air Pollution, Annual Meeting, 11th, Tokyo, Japan, 1970.)*

The effect of acetylcholine on the air ducts of guinea pigs already exposed to various concentrations of ozone, (03), nitrogen dioxide (NO2), and sulfur dioxide (SO2) was studied. The guinea pigs in the test group were exposed to various gases for 30 to 45 min. They were mingled into the controlled group after a rest period of 30 to 45 min and then exposed to acetylcholine in aerosol form, weak enough not to kill the control animals. All the guinea pigs showed a symptom of breathing difficulty, but the test groups which had been exposed to O3 and to NO2 showed a quicker and stronger reaction than the control group; many of them died eventually. The lowest gas concentrations which brought such a phenomenon were approximately two ppm O3 and 40 ppm NO2. This coincided with the results of the previous tests with other allergen inhalations. Sulfur dioxide showed no effect even at the concentration of 600 ppm and even when the time lapse between exposures was decreased to 10 min. This result also coincided with the previous experiments. Ozone and NO2 require attention as a media intensifying the breathing difficulty caused by allergens.

13177 APTIC NO. 30167

Miyamoto, Terumasa

ATMOSPHERE -- SULFUR DIOXIDE. *(Taiki -- aryusangasu). Text in Japanese. Naika, 27(5):823-826, May 1971.*

This report is concerned with the effects of sulfur dioxide on plants, animals, and humans. Sulfur dioxide enters plants through the stomata of leaves, damages cellular tissue, and turns leaves brown and ivory. Sulfur dioxide causes tissues to die and ciliary movement in bronchial tubes to stop in humans and animals. The long-term exposure of animals to 10 ppm SO2 slows down ciliary movement. High concentrations are very toxic, and SO2 effects the bronchi and lung more 24 hrs after exposure than right after the exposure. There is insufficient data on the effect of long-term exposure to SO2. However, it is known that the vitamin C content in digestive organs, the kidney, and the liver decreases and life expectancy decreases as the concentration increases. One ppm of SO2 increases the frequency of respiration and pulse; 10-20 ppm of SO2 irritates the throat (pharynx); and 300-500 ppm of SO2 causes toxic symptoms even for a short-term exposure. Regional epidemiologic studies have attempted to show quantatively that deterioration of lung function is due to air pollution. However, no significant difference in lung function for residents of polluted and nonpolluted areas was found.

13178 APTIC NO. 30396

Miyamoto, Terumasa

AIR POLLUTION AND RESPIRATORY DISEASES. *(Taikiosen to kokyukishikkan). Text in Japanese. Sanfujinka no Sekai (World Obstet. Gynecol.), 23(4):351-354, April 1971.*

Historical examples of air pollution damage, various respiratory diseases influenced by air pollution, and the relationships between constitution and air pollution are described. Bronchial asthma, chronic bronchitis, vesicular emphysema, pneumoconiosis, and lung cancer are increasing in Japan and abroad. Among these diseases, bronchial asthma and chronic bronchitis are easily influenced by air pollution; the rise and fall of these symptoms are related to sulfur dioxide concentration and to dust fall. Chronic bronchitis has a connection with smoking, like vesicular emphysema and pulmonary fibrosis. The incidence of pneumoconiosis and lung cancer is higher in those who have many ooportunities for inspiring dust than it is in others. Allergies are also easily influenced by air pollution. In animal experiments if an antigen is inspired after the inspiration of air pollutants, sensitization via the airways is easily established. Though it is noted that alpha 1 antitrypsin in the blood may take part in the crisis of vesicular emphyseam, the relationship between its quantity and the basic factor easily influenced by air pollution has not been clarified.

13179 APTIC NO. 30895

Mori, K., S. Nakamura, K. Andoh, and T. Miura

COMBINED EFFECTS OF X-IRRADIATION AND NO2 GAS EXPOSURE ON RES (I). *(Monaikei saibo ni yoru seitai bogyo (I) X sen to NO2 gas bakuro no fukugo koka). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):146, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, Tokyo, Japan, 1970.)*

Effects of nitrogen dioxide on bodies weakened by X-ray were observed in 20 mice in a control group, 20 mice exposed only to NO2, 30 mice exposed only to X-ray, and 30 mice exposed first to X-ray and then to NO2. The two control groups were exposed to the atmosphere (less than 0.05 ppm NO2) and the two exposure groups were put in exposure chambers with 0.9 plus or minus 0.1 ppm for 30 days and nights. A sub-lethal dose of X- ray 65 O R was determined after exposing four different groups of mice to 400 R, 500 R, 600 R, and 700 R and obtaining 20% death from the 600 R group and 93% death from the 700 R group. Changes in weight were measured every other day. Non-X-ray and NO2 exposure only groups) had no death and followed similar patterns of health and weight. Death following X-ray was 23% for both control and exposed groups. Weight patterns in the NO2 exposure groups were close, and NO2 seemed to show the effects of X-rays sooner than the X-ray only group, and also to postpone recovery from the effects of irradiation. However, for the most part, no significant effects were noted of NO2 gas in combination with X irradiation.

13180 APTIC NO. 30774

Mueller, B.

NITROGEN DIOXIDE INTOXICATION AFTER A MINING ACCIDENT. *Respiration, vol. 26:249-261, 1969. 16 refs.*

After a mining accident, seven men became sick from nitrogen dioxide intoxication of the lungs. Three were hospitalized. The pulmonary functions of all the patients were clinically observed over a 14-month period. Five patients recovered some time between seven and 14 months after the accident. Two patients suffered from a mild bronchitis previous to the accident; their symptoms became worse after the accident. They are now handicapped in carrying out their daily duties. The nitrogen dioxide intoxication of the lungs had a latent period from hours to weeks. The question of autoimmunization was raised. Alterations in oxygen consumption, enzyme changes, tracheitis, bronchitism and pulmonary edema were common. Not much was said with regard to therapy. Shock was another symptom. Oxygen, corticosteroids, and antibiotics were given according to the condition of the patient. (Author summary modified)

13181 APTIC NO. 30580

Nakajima, Taichi, Shigeko Kusumoto, Chentung Chen, and Kazuya Okamoto

STUDIES ON THE CONTENTS OF REDUCED GLUTATHIONE, AND HISTOPATHOLOGICAL STUDIES ON THE LUNG OF MOUSE EXPOSED TO NITROGEN DIOXIDE GAS. APPENDIX: EFFECTS OF NITRITE AND NITRATE ON THE GLUTATHIONE REDUCTASE IN VITRO. *(Nisankachisso chokirenzokubakuro no mausuhai no kangengate gurutachionryo ni oyobosu eikyo to byrossoshikigakuteki henka. Fu; gurutachionkangenkoso ni taisuru ashosan en, shosan en no sayo). Text in Japanese. Osaka-furitsu Koshu Eisei Kenkyusho Kenkyu Kokolu, Rodo Eisei Hen Iproc. Osaka Public Health Inst., Ed. Ind. Health), no. 7:35-41, Sept. 1969. 11 refs. (Presented at the Japan Society for Air Pollution, Annual Meeting, 9th, 1968, and at the Japan Society for Hygiene, Annual Meeting, 39th, 1969.)*

Mice were continuously exposed to nitrogen dioxide to obtain medical indices for evaluating the harmful effects of automobile exhausts in low concentrations before the appearance of clinical symptoms. The exposure period was one month, and the concentration of NO2 gas was 0.8 ppm. The quantity of glutathione (GSH) in the lung and the liver was measured colorimetrically, using dithionitrobenzene, on the second, the 15th, and the 30th days after exposure, respectively. The mice exposed to NO2 showed tendency to be inferior to the control group in their body growth from the 15th day after exposure, but the difference was not significant. The quantity of GSH in the lung and the livers of the exposed mice increased from 15th day after exposure, but significant differences were not seen between the exposed and the control group on the 30th day after exposure. From the view-point of pathological histology, a pathologic-histologic change was observed in the lung and the trachea of the exposed mice after the 15th day of exposure. Increased mucus secretion vacuolar degeneration, and sloughing off of cells were observed in the epidermal mucous membrane of the trachea. A slight blood congestion was observed in the submucosal tissues of the trachea but no abnormal condition was seen in the lung or cartilage tissue. On the 20th day after exposure, the change of mucous membrane of the trachea reached the bronchioles. Furthermore, acceleration of mucous secretion was observed in the lung tissues. Bronchial catarrh was observed as the change in the lung and the trachea. To trace the origin of the decreased amount of GSH by exposure to NO2 the action of nitrite and nitrate salts on glutathione and the reducing enzyme of glutathione was experimentally investigated in vitro. It was considered that the decreased amount of GSH by exposure to NO2 resulted from the direct oxidizing action of NO2 on GSH.

13182 APTIC NO. 30248

Nieding, G. von, M. Wagner, H. Krekeler, U. Smidt, and K. Muysers

MINIMUM CONCENTRATIONS OF NO2 CAUSING ACUTE EFFECTS ON THE RESPIRATORY GAS EXCHANGE AND AIRWAY-RESISTANCE IN PATIENTS WITH CHRONIC BRONCHITIS. *(Grenzwertbestimmung der akuten NO2-Wirkung auf den respiratorischen Gasaustausch und die Atemwegswiderstaende des chronisch lungenkranken Menschen). Text in German. Intern. Arch. Arbeitsmed., 27(4):338-348, 1971. 25 refs.*

A nitrogen dioxide-air mixture containing 0.5 to 5.0 ppm NO2 was administered to 88 patients with chronic bronchitis for 15 min. Before and after inhalation the following measurements were performed: tidal volume, minute volume, frequency and oxygen-uptake; arterial gas pressure and arterial pH; the end expiratory gas pressures and the end expiratory arterial pressure differences; and airway resistance. The end expiratory oxygen pressure remained nearly constant during the inhalation of 5 and 4 ppm NO2. However, a significant decrease of the arterial oxygen pressure, and accordingly an increase of the end expiratory arterial oxygen pressure differences, occurred. After the inhalation of NO2 concentrations down to 1.5 ppm, the airway resistance increased significantly. Lower concentrations had no significant effect.

13183 APTIC NO. 30237

Nose, Yoshikatsu, Hiroo Uenol, and Masako Nakayama

THE RELATIONSHIP BETWEEN THE SYMPTOMS OF THE PATIENTS WITH OBSTRUCTIVE RESPIRATORY DISEASES AND AMBIENT AIR QUALITY STANDARDS FOR SULFUR OXIDES. *(Heisokusei kokyuki kanja no shojo to iosankabutsu no kankyokijun tono kankei). Text in Japanese. Japan Industrial Medical Society, Japan Ind. Med. Soc. Meet. 44th, Tokyo, Japan, 1971, p. 154-155. (April 3-4.)*

Since 1950, five cities in Yamaguchi prefecture (Ube, Onoda, Mine, Tokuyama, and Shinnanyo) have applied the Ube Method to control pollution sources based on mutual agreement of the regional society in accordance with the scientific data. In 1969, pollution was below 0.05 ppm/hr for 73.8% of the total hours throughout the year at Ube, 82.5% at Onoda, and 84.5% at Tokuyama. Although prefectural government authorities take a serious view of the ambient air quality standard for sulfur dioxide, they treat the effect of pollution due to fine particles lightly. According to epidemiologic investigations in some cities of the prefecture, the effects of pollution on the human body are apparent even when the sulfur oxide levels are below the standard. This indicates that not only the single effect of SO2 gas, but also the arithmetic or geometrical effects of SO2 gas and fine particles should be considered, and that the establishment of an air quality standard for fine particles is an urgent problem.

13184 APTIC NO. 30749

ODonnell, Robert D.

METHODS OF HUMAN PERFORMANCE MEASUREMENT IN TOXIC ENVIRONMENTS. *Proc. Conf. Atmospheric Contamination in Confined Spaces, p. 9-16, 1969. 8 refs. (Sept. 16-18.)*

NTIS, DDC: AD 710678

One of the most powerful techniques available for evaluating the effectiveness of performance tests is that of factor analysis, by which clusters are isolated that represent a particular skill. Thus, it can be determined what each test measures in terms of the kinds of test performance which are correlated with it, and how well a performance is measured. The relationship between factor analyzed performance tests and more complex real world performances is discussed, as well as the molecular approach to toxicological research.

13185 APTIC NO. 30837

ODonnell, Robert D., Peter Mikulka, Patrick Heinig, and James Theodore

EFFECTS OF SHORT-TERM LOW LEVEL CARBON MONOXIDE EXPOSURE ON HUMAN PERFORMANCE. *Aerospace Medical Research Lab., Wright Patterson AFB, Ohio, Medical Div., Proj. 6302, Task 630202, AMRL-TR-70-37, 52p., June 1970. 25 refs.*

NTIS, DDC: AD 717716

The effects of 0, 50, 125, 200, and 250 ppm carbon monoxide on human time estimation, ataxia, galvanic skin response, and heart rate were tested in ten subjects as part of an evaluation of atmospheric contaminants that may arise in confined spaces which could have toxic effects on the brain and nervous system. Mean carboxyhemoglobin levels from .96 to 12.37% were reached after three hours of exposure. No significant symptoms were reported by the subjects, and no ability to detect the presence of CO was noted. No overall trend toward poorer estimates of a ten-second interval occurred as a function of CO uptake, nor did tracking performance deteriorate. No changes in absolute heart rate occurred in any group, but there was slightly less cardiac deceleration at the onset of a task in CO groups during early exposure. There were some indications that subjects under CO showed a different overall pattern of tracking over time than control subjects, in that their performance curve was flatter. However, this observation must be considered tentative. No differences in galvanic skin response were found. It is concluded that these data do not support the hypothesis that low level CO exposure results in human performance decrements. (Author abstract modified)

13186 APTIC NO. 30798

Oosterwijk, A. R. Kolff van

APPLICATIONS OF ASBESTOS. *(Toepassing van asbest). Text in Dutch. Ingenieur, 82(14):43-47, April 3, 1970.*

A detailed list is given of the various products that make use of asbestos. Products such as asbestos cement which contain other substances in combination with the asbestos do not constitute a danger to workers who handle them in this form. The basic occupational health problem in connection with asbestos is to avoid breathing the loose asbestos fibers. In England, a maximum permissible limit has been set, corresponding to a concentration of 12 fibers/cu cm. When this limit is exceeded, the law requires the use of protective masks. An exception is made in the case of crocidolite. When this form of asbestos is used, a protective mask must always be worn. The three most commonly used types of asbestos (chrysotile, amosite, and crocidolite) have been identified as capable of causing asbestosis or mesothelioma. Other types, such as anthophyllite, temolite, and actinolite do not have this effect. The most dangerous type of asbestos fibers are those less than five micron in diameter, since they are capable of eluding the human body s defense mechanism and penetrating deeply into the lower respiratory tract, including the lungs.

13187 APTIC NO. 30728

Roche, L., A. Marin, and A. Nicolas

PNEUMOPATHIES CAUSED BY VAPORS OF NITROGEN OXIDES. *(Les pneumopathies par vapeurs nitreuses). Text in French. Arch. Mal. Prof. (Paris), 18(3):309-310, May-June 1957. 1 ref.*

Pneumopathies from nitrogen oxide vapors occur in occupations requiring the handling of nitric acid and in those where nitrogen and oxygen are exposed to high temperatures (welding). Clinically, the severity of the initial affliction is governed by the concentration of the toxic vapors. Diagnosis is often made difficult by the latent period extending from several hours (in very severe poisoning) to 2 weeks (in less severe cases). Symptomatically, light cases of poisoning resemble conventional bronchitis of pulmonary congestion. The development of severe forms of poisoning is variable. The appearance of slow-healing pulmonary abscesses has been reported. Recovery takes several weeks. All persons affected, including those who recover completely, show a particular sensitivity to inhalation of irritating gases which usually requires a change of job. Asthenia persists usually for several months. Chronic poisoning occurs in workers exposed for a long period of time to low concentrations of nitrogen oxides, include cough, increasingly abundant expectoration, and short episodes of pulmonary infection. Alteration of the bronchial epithelium is a diagnostic indicator. The long-term prognosis varies:some cases heal spontaneously, others develop severe pulmonary afflictions. No specific therapy exists; usually oxygen, cardiovascular analeptics, and diuretics are administered.

13188 APTIC NO. 30897

Rokushika, T., M. Aoyama, and K. Hayashi

EFFECTS OF AUTOMOTIVE EXHAUST ON THE LIVING BODY. *(Jidosha haiki gasu no seitai ni oyobosu eikyo). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):139, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, Tokyo, Japan, 1970.)*

The effects of exhaust gas were studied on 12 male rats of approximately 180 g and 15 male and 15 female mice of approximately 14 g. They were divided into three groups and left in test boxes installed at (A). center city Nagoya (94,426 cars per day): (B). south Nagoya on highway No. 1 (44,173 cars per day); and (C). residential Nagoya on Nagoya City University campus. All test animals were weighed once a week; carboxyhemoglobin content was observed only in the blood of rats. After six months, they were all dissected and lungs and brain nerves were examined by hematoxylin eosin. Carbon monoxide concentrations in the animals in group A was approximately 10-20 ppm per hour; group B, 10-15 ppm; and group C, only a trace. All rats grew approximately 2.2 times in weight and all mice grew three times in six months. Carboxyhemoglobin values were: A, 2-18%, B, 2-12%; and C, 0-2%. Lungs of animals in groups A and B were visibly gray- black and the degree of particulate adhesion was the greatest in group A, less in group B and the least in group C. Fibrosis images were recognizable and carbon particulates were visible in alveolar walls of the lungs of groups A and B. Little trace of particulates were recognized on part of alveolar walls of the lungs of the animals in group C. Animals in group A showed the signs of shrinkage, deformity, pyknosis of cerebral cortex, and cerebellum cells and those in group B showed similar results; but the brain nerve systems of animals from group C were normal.

13189 APTIC NO. 30853

Saffiotti, Umberto

MORPHOLOGY OF RESPIRATORY TUMORS INDUCED IN SYRIAN GOLDEN HAMSTERS. *National Cancer Inst., Bethesda, Md. and Atomic Energy Commission, Washington, D. C., Proc. Conf. Morphol. Exptl. Respirat., Carcinogenesis, Gatlinburg, Tenn., 1970, p. 245-254. 25 refs. (May 13-16.)*

NTIS: CONF-700501

A new method was developed for the administration of carcinogens by intratracheal instillation; it consists of dispersing the carcinogen in fine crystalline particles (mostly smaller than one micron) attached by surface adhesion to similarly fine particles of a carrier dust (e.g., ferric oxide) to produce a homogeneously mixed dust. The dust, suspended in saline, is administered by intratracheal instillation. In the hamster, the nasal cavities readily respond to diethylnitrosamine (DEN) but not to polynuclear hydrocarbons. The larynx and trachea show a marked susceptibility to the induction of squamous cell carcinomas with polynuclear hydrocarbons, but no such tumors with DEN, which in turn induces a massive response of histologically benign papillary tumors. The stem bronchi give a high yield of squamous cell carcinomas with polynuclear hydrocarbons but only a few papillary tumors with DEN. The main segmental bronchi still give rise to many squamous carcinomas with polynuclear hydrocarbons but give practically no tumors with DEN. The terminal bronchioles, the respiratory bronchioles, and the alveoli, on the other hand, react together with a range of proliferative responses to polynuclear hydrocarbons and to DEN; they appear to be the main site at which particulates exert their synergistic effect on cells that have been pretreated with DEN. Now that the hamster has provided a series of experimental models for the induction of different types of tumors in different segments of the respiratory tract, these models can be used for studying and defining the main cellular types involved in the neoplastic response and their function.

13190 APTIC NO. 30808

Salas, Francisco Nunez

OCCURRENCE OF CARBON MONOXIDE IN THE OCCUPATIONAL ENVIRONMENT: MEDICAL ASPECT; EXPERIENCES OF THE AUTHOR. *(Incidencia del monoxido de carbono en el medio ambiente de trabajo. Aspecto medico; Experiencias personales). Text in Spanish. ION (Madrid), 31(355):66-72, Feb. 1971.*

The maximum permissible concentration of carbon monoxide in the working environment of a factory varies greatly from one country to another, and even within the same country. This is explained by the variety of individual reactions to the gas, creating difficulties in setting the boundary between toxic and innocuous. An American conference of industrial hygienists has proposed that the maximum be set at 50 or 60 ppm instead of the earlier limit of 100 ppm for an exposure period of eight hours per day. The present North American limit is 50 ppm, while England and the Soviet Union have set limits at 58 and 20 mg/cu m, respectively. The symptoms of carbon monoxide poisoning are classified into the categories of mild, acute, and subacute. The more chronic the exposure to CO, the more enduring and irreversible the symptoms become. Considerable attention is given to the bodily mechanisms involved when CO poisoning occurs, such as anemia, anoxia, and hyperacidity of the blood. The treatment used for acute cases of CO poisoning are described and the provisions made for prompt first aid.

13191 APTIC NO. 30575

Santuccio, Concetto

IS THE NATURAL ENVIRONMENT DOOMED TO DIE? (L ambiente naturale condannato a morire)? Text in Italian. Ingegnere (Milan), 45(1):55-73, Jan. 1971.

The study of global ecology helps one to understand that the crisis in the relationship between man and the biosphere is not one of mere technology, but of the way in which technology is used; it is not just a problem in technology or natural history, but more than anything else a cultural problem. The history of ecology is a scientific discipline is traced from Alexander von Humboldt to Rachel Carson, with quotations from many sources, including paper encyclicals, and descriptions of various modern methods to promote environmental preservation, such as conference and earth days. Special attention is given to the efforts of the United States and the Soviet Union, as countries who had previously formulated a myth of unlimited natural resources, which must now be combatted by vigorous educational efforts. A comparison of mortality figures for the years 1932-1934 and 1959-1961 shows an increase in the incidence of deaths caused by cancer from 6.4% to 16.2%, and of deaths due to respiratory diseases from 14.1% to 29.9%. A study of absences due to illness of drivers employed by the transit authority of Rome shows the following increases over a five-year period: emotional illness, 105.49%; other ailments of the central nervous system, 205.54%; gastroduodenal ulcers, 139%; gastroenteritis and acute colitis, 702.09% diseases of the liver and biliary tract, 114.23%; diseases of the bones and motor organs, 513.98%.

13192 APTIC NO. 30308

Sasa, Tsurayuki, Kunio Aso, Fumio Kida, Jugoro Takeuchi, Tadao Tsubaki, Haruhiko Tokuomi, Toshio Toyama, Noboru Hagino, Toshiyuki Fujino, Masakichi Mikuni, Isamu Murata, and Ukichi Ishibashi

STUDY ON THE RANGE OF DISEASES BY ENVIRONMENTAL POLLUTION. *(Kogai no eikyo ni yoru shippei no hani to ni kansuru kenkyu). Text in Japanese. Japan Public Health Assoc., 48p., March 1970.*

A committee was organized to investigate problems concerning the names of diseases, their deuteropathy, and test items, which are the objects of the health injury assistance scheme. Particular attention was given to diseases caused by air pollution, organic mercury compounds, and cadmium. Bronchial asthma, chronic bronchitis, asthmatic bronchitis and vesicular emphysema were selected as the names of diseases caused by air pollution. It was decided that their secondary symptoms should be treated collectively as deuteropathy. For diagnosis, Fletcher s definition for chronic bronchitis, the American Thoracic Society s definition for vesicular emphysema were used. Fifteen test items of pulmonary function and chest direct radiography were selected. Diseases caused by organic mercury compounds are called Minamata disease. As the attentive points for diagnosis, 11 items for congenital Minamata disease, two items for the acquired disease, and three other items (visual field, eye ground, and exact hearing tests) are considered essential for examination. The disease caused by cadmium injury was called Itai-itai disease for which five diagnostic items and ten items, such as blood test, chest x-ray, and urinalysis were selected for necessary examination.

13193 APTIC NO. 30334

Sawinsky A., J. Durszt, and G. Pasztor

LEUKOCYTE DAMAGE THROUGH EXPOSURE TO LEAD. *(Leukozytenschaedigung bei Bleiexposition). Text in German. Z. Ges. Hyg. Grenzg. (Berlin), 17(4):239-240, 1971. 10 refs.*

Fifty workers, from three different lead processing plants were examined for specific changes and functional damage caused by lead exposure. The lead concentration of the air in the three plants was, on the average, 125, 210 and 625 mg/cu m. In the control group of 25 men, no specific changes were observed, whereas the porphyrin content in the urine of the exposed men was 100-1500 mg/l and the urine lead content 100 to 500 mg/l. The phagocytic activity of the leukocytes was considerably reduced compard to the control group. The osmotic resistence of the cells, primarily those of the meyloid forms, was below normal. The distribution of the neutrophile granuocytes changed and the activity of the younger cells increased. The segmentation of the neutrophile granulocytes rose and a shift to lymphoid cells was observed in the qualitative blood picture.

13194 APTIC NO. 30340

Schoenberg, Bruce S., John C. Bailar, and Joseph F. Fraumeni

CERTAIN MORTALITY PATTERNS OF ESOPHAGEAL CANCER IN THE UNITED STATES, 1930-67. *J. Nat. Cancer Inst., 46(1):63-73, Jan. 1971. 26 refs.*

Cancer of the esophagus shows substantial racial, geographic, and temporal variation within the United States. In a cohort analysis of mortality during 1930-1967, the nonwhite population experienced steadily and rapidly increasing rates, while those of the white population remained relatively stable. Thr rising nonwhite mortality occurred at all ages and all areas of the country; it was more pronounced among males than females. Death rates in the Northeast were consistently higher than in other regions of the country, with the geographic differential being more prominent among nonwhites than whites. Detailed analysis of the nonwhite statistics for 1950-1966 showed that Negro males and females and Chinese and Japanese males contributed to the excess in mortality. However, only Negroes had a steady increase in mortality over time. To study the factors implicated in the origin of esophageal cancer, mortality rates by States for 1950-1966 were compared with the following variables for each State: the percentage of population living in urban areas; per capita cigarette sales; and per capita alcohol sales. Mortality showed significant geographic correlations with each of these three variables, but the association with cigarette and alcohol consumption seemed to result from some other hazard in the urban environment. The striking racial variations in esophageal cancer suggest that Negroes have been increasingly exposed, and are more susceptible to, these carcinogenic influences. (Author summary modified)

13195 APTIC NO. 30189

Schroeder, Henry A., Douglas V. Frost, and Joseph J. Balassa

ESSENTIAL TRACE METALS IN MAN: SELENIUM. *J. Chronic Diseases, 23(4):227-243, 1970. 40 refs.*

To obtain data on environmental sources and human exposures to selenium, a number of common foods, wild and domestic animal tissues, and human tissues were analyzed by a photofluormetric technique. Selenium was found in few vegetables or fruits, but seafood, meats, and most grains contained appreciable amounts. The daily intake in a standard diet was 62 microgram. Cooked and processed foods contained considerably less selenium than raw foods. Wild animals contained two to three times as high a concentration of selenium as human tissues. Kidneys showed the highest concentrations. The calculated human body burden of selenium is 14.6 mg (range 13-20 mg). Selenium did not accumulate in human hair with age, but increased in hair of rats fed selenate. Although there is no recorded case of human or animal cancer attributable to environmental selenium, the element is the most toxic of those known to be essential for mammals. In mammals, excess selenium is teratogenic, hepatotoxic, and neurotoxic, retarding growth and causing muscular weakness. Selenium deficiency is associated with hepatic necrosis, retarded growth, muscular degeneration, and infertility. Because of possible toxicity from residues in food animals, selenium probably should not be added routinely to animal feedstuffs, but deficiency treated as it occurs locally. (Author summary modified)

13196 APTIC NO. 30585

Shabad, L. M.

REVIEW OF ATTEMPTS TO INDUCE LUNG CANCER IN EXPERIMENTAL ANIMALS BY TOBACCO SMOKE. *Cancer, 27(1):51-54, Jan. 1971. 21 refs.*

Recent chemical-analytical and biological work undertaken in the USSR on the carcinogenity of tobacco is reviewed with emphasis on studies attempting to induce lung cancer in laboratory animals. In one such study, bronchogenic lung cancer compatible with cancer as seen in human smokers was induced in rats by the neutral fraction of tar containing polycyclic hydrocarbons. The fact that only two out of the 43 rats receiving the tar developed lung carcinoma suggests that the carcinogenic activity of tobacco tar is comparatively low. However, further investigations are necessary since the experiments involved instilling concentrated cigarette tar rather than whole smoke into the respiratory tract. Despite the occurrence of proliferative lesions, epithelial metaplasia, and papillary growth of the bronchial epithelium, no true cancers were found in rabbits who smoked 28000-700 g of tobacco over a 1-4 yr period. When cigarette smoking was combined with intratracheal injections of small doses of benz(a)pyrene, the changes found were more precancerous in nature and appeared earlier. The importance of the age sensitivity of lung tissue to carcinogenic agents is illustrated by the results of investigations on organ cultures of embryonic lung tissue transplants treated with urethan or nitrosamines.

13197 APTIC NO. 30677

Shaw, Margery W.

HUMAN CHROMOSOME DAMAGE BY CHEMICAL AGENTS. *Ann. Rev. Med., vol. 21:409-432, 1970. 16 refs.*

The chemical agents which break chromosomes (clastogens) are reviewed. A table is provided listing approximately 200 chemical and physical agents which are proven or suspected clastogens or mutagens. These chemical agents include nucleic acid-related compounds, which inhibit DNA and RNA, and protein synthesis, and streptomyces-derived antibiotics, which inhibit DNA, RNA, and protein synthesis. Central nervous system drugs, such as analgesics, antinauseants, antidepressants, and hallucinogens break chromosomes. Some food ingredients, additives, and preservatives have proven to be clastogenic or mutagenic. Although little is known about the effects of air and water pollutants, their genetic effects on future generations and their contribution to a current increase in mortality rates should be studied. The relevant air pollutants listed include benzo(a) pyrene, nitric oxide, and ozone. Insecticides, plant growth inhibitors, and alkylating agents are also considered clastogens. Acridine and its related dyes are mutagenic in microorganisms; they are also clastogenic in Drosophila and higher plants. Antifolic compounds, alcohols, inorganic chemicals, and physical agents are also discussed. Most chromosome breaks heal by rejoining, resulting in resitution of the original configuration. If, however breakage at two sites is followed by the union of different chromosome segments, new chromosomes are formed. If these new structures are stable, they can be perpetuated; if unstable, they are lost in subsequent cell generations. The stable rearrangements are those which concern the physician and his patient because they can result in unbalanced genetic constitutions and be passed to future generations. This is one reason why practitioners should know about possible clastogenic effects of the drugs they administer and insist on careful testing of old and new pharmacologic agents.

13198 APTIC NO. 30766

Shorter, Roy G.

CELL KINETICS OF RESPIRATORY TISSUES, BOTH NORMAL AND STIMULATED. *National Cancer Inst., Bethesda, Md. and Atomic Energy Commission, Washington, D. C., Proc. Conf. Morphol. Exptl. Respirat. Carcinogenesis, Gatlinburg, Tenn., 1970, p. 45-61. (May 13-16.)*

NTIS: CONF-700501

The methods used for studies of the cell kinetics of respiratory tissues and the findings in these studies in normal and carcinogen- treated rodents are reviewed and evaluated. While these experiments have been simple, in some instances the findings have been contradictory. Since the precise morphologic identification of some of the cell populations in the lung is difficult, many problems arise. The turnover time of rodent epithelial cells in trachea, bronchi, and bronchioles have been experimentally determined, with differing results. Other varying results have been obtained in studies of mitoses in aveolar cells, the turnover time of pulmonary cells, pulmonary cellular kinetics, and cell kinetics in human tumors of the respiratory tract. More precise morphologic classification could improve lung data evaluation.

13199 APTIC NO. 30143

Skoda, Vaclav and Ivan Wojtovic

DUST GENERATOR FOR DUST EXPOSURE EXPERIMENTS WITH LABORATORY ANIMALS. *(Tierbestaubungsanlage mit nativem Staub). Text in German. Staub, Reinhaltung Luft, 31(5):197-200, May 1971. 9 refs.*

A dust generator is described for the exposure of small laboratory animals to dust-laden air. It comprises a freezing box where the air is cooled to minus 12 C. This temperature eliminates water condensation at high relative humidity and improves the capacity of the compressor. The dust generator is driven by a single-stage, two-cylinder compressor with a compressed air capacity of 0.3 cu m/min. The pressure of the air supplied to the dust generator must be constant at 4.5 kg force/sq cm. The compressor is followed by the dosing device, the actual dust generator, which crushes the material by impacting the rapidly moving particles. The dust exposure chamber is a horizontal octagonal prism: The height of the prism is one m. The chamber has a volume of 1.60 cu m. For measurement of the dust, a scattered light photometer and gravimetry were used. The initial material with grain sizes of 0.1 to 0.6 mm was crushed to grain sizes of seven micron. Within 10 sec, the dust penetrated into the lungs of the laboratory animals. The dust concentration is adjustable between two and 1800 mg/cu m. Exposure of rats to quartz dust produced by this apparatus caused pathologic changes of the lung tissue after five days. The biologic effect of quartz dusts on the lungs of rats depends on the preparation method. The dust generator can also be used for classification and comparison of dust measurement methods.

13200 APTIC NO. 30763

Smith, William E., Llonas Miller, and Jacob Churg

AN EXPERIMENTAL MODEL FOR STUDY OF COCARCINOGENESIS IN THE RESPIRATORY TRACT. *National Cancer Inst., Bethesda, Md. and Atomic Energy Commission, Washington, D. C., Proc. Conf. Morphol. Exptl. Respirat. Carcinogenesis, Gatlinburg, Tenn., 1970, p. 299-316. 16 refs. (May 13-16.)*

NTIS: CODF-700501

Data are presented on yields, times of observation, and types of tumors in the respiratory tracts of hamsters after intratracheal injections of different doses of benzo(a)pyrene suspended in one percent Tween 60. These data afford baseline information for studies of promotion or inhibition of carcinogenesis in the respiratory tract by other substances. Addition of chrysotile to intratracheal injections of benzo(a)pyrene did not appreciably alter the incidence of papillomas in the larynx, trachea, and extrapulmonary bronchi, but did increase incidence of tumors in the lungs. Some possible mechanisms are discussed. (Author abstract)

13201 APTIC NO. 30198

Speizer, F. E., B. Ferris, Jr., and W. Burgess

THE PREVALENCE OF RESPIRATORY FINDINGS IN A POPULATION WITH DEFINED CHRONIC EXPOSURE TO AMBIENT LEVELS OF AUTOMOBILE EXHAUST. *Chest, 59(5):32-33, May 1971.*

The prevalence of chronic non-specific respiratory diseases was assessed using a modified version of the Medical Research Council's Respiratory Disease questionnaire in a population of 268 New England policemen exposed to a spectrum of levels of automobile exhaust as traffic officers, in-car officers, and inside clerical officers. Pulmonary function was assessed by spirometric tracing of FEV and FVC; peak expiratory flow was measured by the Wright peak flowmeter; and flow-volume curves were obtained on a Krogh spirometer modified and constructed for use in field studies. There were 99 men (36.9%) who fulfilled the criteria for the diagnosis of disease; two-thirds of these diagnoses were simple chronic bronchitis alone. Levels of cigarette smoking and history of years of exposure in traffic were included in the correlations. The lead content in scalp hair was also determined.

13202 APTIC NO. 30251

Stebbings, James H.

CHRONIC RESPIRATORY DISEASE AMONG NONSMOKERS IN HAGERSTOWN, MARYLAND. II. PROBLEMS IN THE ESTIMATION OF PULMONARY FUNCTION VALUES IN EPIDEMIOLOGICAL SURVEYS. *Environ. Res., 4(3):163-192, April 1971. 53 refs.*

Prediction equations for the one second forced expiratory volume and the peak expiratory flow rate in a population of white, male nonsmokers are presented. Data are also presented to demonstrate the superiority, for epidemiological purposes, of the maximum pulmonary function value in a series of trials over the mean of the sequence. Statistically significant and sizable instrument and interviewer effects were found. A technique for taking these effects into account is presented. A review of the literature covering prediction equations, distribution of the pulmonary function variables, the independent variables, and components of variance of pulmonary function tests is presented. Analysis of the published data suggested that the relationship of pulmonary function values to weight, chest expansion and diameter, and hand grip strength should be reinvestigated. Factors influencing the variability of an individual s pulmonary function values are discussed. The importance of these questions to the design and analysis of longitudinal studies of pulmonary function values is emphasized. (Author abstract modified)

13203 APTIC NO. 30252

Stebbings, James H., Jr.

CHRONIC RESPIRATORY DISEASE AMONG NONSMOKERS IN HAGERSTOWN, MARYLAND. I. DESIGN OF THE STUDY AND PREVALENCE OF SYMPTOMS. *Environ. Res., 4(3):146-162, April 1971. 22 refs.*

The prevalence rates of the standard respiratory symptoms are presented for a population of white, male nonsmokers, and the research methodology is discussed. The observed rates for chronic bronchitis are among the lowest for nonsmokers reported in the literature. Cough and phlegm were often associated with a history of sinusitus and hayfever; dyspnea was most often associated with histories of coronary disease and hypertension. The association of these symptoms with conditions other than respiratory ailments implies that responses in the standard respiratory questionnaire, as commonly analyzed, may not adequately discriminate among upper respiratory allergic conditions, lower respiratory symptoms, and cardiovascular symptoms for epidemiological purposes. (Author abstract modified)

13204 APTIC NO. 30148

Steiger, Herbert and Arthur Brockhaus

STUDY CONCERNING THE MORTALITY IN NORTH RHINE WESTPHALIA DURING THE INVERSION WEATHER CONDITIONS OF 1962. *(Untersuchungen zur Mortalitaet in Nordrhein-Westfalen waehrend der Inversionswetterlage Dezember 1962). Text in German. Staub, Reinhaltung Luft, 31(5):190-192, May 1971. 8 refs.*

During the inversion weather conditions of December 1962, which were accompanied by an increase in particulate and sulfur dioxide concentrations, an increase of the mortality in the Ruhr Valley occurred. It was assumed that the higher mortality rate was connected with the higher air pollution. For confirmation of this assumption, the mortality rate outside the Ruhr Valley was studied for the same period of time, namely for December 3 to 15, 1962. A significant, but a relatively lower increase, was only found in the Duesseldorf and Cologne regions. Further division according to districts did not give any clear results. A division according to areas of different population densities has shown an increase in the mortality rate in the densely populated areas. The results indicate that the higher death rate was due to the higher concentration of air pollutants.

13205 APTIC NO. 30197

Stephens, Robert J., Gustave Freeman, and Michael J. Evans

ULTRASTRUCTURAL CHANGES IN CONNECTIVE TISSUE IN LUNGS OF RATS EXPOSED TO NO2. *Arch. Internal Med., 127(5):873-883, May 1971. 22 refs. (Presented at the Hanford Biology Symposium on Pollution and Lung Biochemistry, 10th Annual, Richland, Wash., June 5, 1970.)*

Striking alterations in both collagen fibrils and basement membranes were revealed with the electron microscope in the lungs of rats exposed to subacute levels of nitrogen dioxide. Collagen fibrils underlying the terminal bronchiole in control rats increase slightly in size with age, and may appear stellate in cross section during old age. In marked contrast, young animals exposed to 17 plus or minus two ppm for three months developed very large fibrils up to 15 times the normal diameter. The same response was observed in animals exposed to two plus or minus one ppm for two or more years. The basement membrane under the epithelium of the terminal bronchiole also became greatly thickened. These alterations were seen after exposure to NO2 at subacute levels that endured neither edema nor significant destruction of cells but caused viable tissue to undergo metabolic alterations reflected by the changes described. (Author abstract)

13206 APTIC NO. 30420

Stumphius, J.

USE OF ASBESTOS. II. MEDICAL CONSEQUENCES OF CONTACT WITH ASBESTOS. *(Gebruik van asbest. II. Medische consequenties van het contact met asbest). Text in Dutch. Ingenieur (The Hague), 82(14):G39-G43, April 1970.*

The exposure of workers in the asbestos industry to asbestos dust may lead to the occupational disease asbestosis. Asbestos bodies which are dumbell-shaped bodies formed around inhaled asbestos needles are found in the lungs of these patients. These bodies are also frequently found in the lungs of inhabitants in industrial areas. The formation of asbestos bodies is believed to be a protection against asbestos. Lung cancer is often a complication of asbestosis. Another consequence of inhaling asbestos dust is a rare tumor called diffuse mesothelioma, resulting from a previous minor exposure to asbestos. The diagnosis of this disease is very difficult. The chance discovery of asbestos bodies on autopsy of the lungs of a shipyard worker led to the examination of the sputum of 227 workers. Asbestos bodies were found in 160, but asbestosis was not observed in any. Free iron pigment was nearly always found in connection with asbestos bodies. Another study revealed 25 cases of diffuse mesothelioma in a six year period among shipyard workers. Thus, a connection between minor occupational asbestos exposure and diffuse mesothelioma was indicated. Asbestos is found in an increasing number of applications, particularly outside the industry. This widening dissemination of asbestos means the possibility of minor asbestos exposure for an increasing part of the population. A higher incidence of mesothelioma in the future is anticipated. (Author summary modified)

13207 APTIC NO. 30355

Suzuki, Shosuke

AUTO EXHAUST GAS--LEAD. *(Jidosha haikigasu--namari o chushin ni). Text in Japanese. Naika, 27(5):816-822, May 1971. 37 refs.*

Automobile exhaust gas--its components, influence on air pollution, characteristics, and the effect of the components (especially lead and carbon monoxide) on the human body is discussed. The chief pollutants of exhaust gas are CO, nitrogen oxides, and hydrocarbons. The proporation of each pollutant in exhaust gas varies with automobile conditions and construction. With respect to the influence of exhaust gas on air pollution, volume of exhaust gas times concentration of a certain gas times time equals exhausted volume of certain gas is a question. The acute effect of CO is quite evident, but there is still divergence of opinion on chronic carbon monoxide poisoning. Considering the effect of 20 ppm CO in the general environment, it is necessary to make a physiological and behavioral study of the effect on age and the central nervous system, including new babies and infants, in connection with the proportion of carboxyhemoglobin. The indices to effects of lead are the amounts of lead, delta-amino- levulinic acid, and coproporphyrin in urine. However, the minimum effective dose of lead that effects these indices remains to be examined. There has been no report so far which indicates that these indices are effected by atmospheric lead of an average of a few micrograms/cu m. In future studies, a rigid distinction should be made between criteria which are academic statements and standards which are a problem of administration and control.

13208 APTIC NO. 30163

Suzuki, Takeo

NITROGEN OXIDES. *(Chissosankabutsu). Text in Japanese. Naika, 27(5):827-832, May 1971. 19 refs.*

The general influences of nitrogen dioxides and nitric oxide are as follows: reduction of visibility by coexisting with particulates; discoloration of materials; corrosion of brass; withering of plants; and odor by coexistance with sulfur dioxide. Occupational diseases due to these substances were classified into four main types: irritation, reversible reaction, shock, and composite. Experimental values are mentioned concerning the effects and toxicity of nitrogen oxides. There is a table of experimental results previously made using nitrogen dioxide exposure (pathological-histological change, resistance to respiratory tract infection). The study of the effects of NO2 on the human body under low concentrations and long term exposures is discussed. It is necessary to mark the effect which accelerates respiratory infection in the polluted area. A study of resistance against strong oxidizing material, like NO2, has been made.

13209 APTIC NO. 30183

Tajima, Yoshio, Kyoko Shinohara, Hideo Kinebuchi, and Toru Yamauchi

THE INFLUENCES OF ATMOSPHERIC FLUORIC FLUORIDE POLLUTION UPON THE SKELETAL DEVELOPMENT OF SCHOOL CHILDREN. *(Fukkabutsu no yoru taikiosen ga gakudo no kotsu seijuku ni oyobosu eikyo). Text in Japanese. Fukushima Igaku Zasshi (Fukushima Med. J.), 18(5-6): 185-189, Dec. 1968. 16 refs.*

In K city, Fukushima Prefecture, the skeletal development of 506 boys and girls in the 5th, 6th, 8th, and 9th grades was examined by x-rays of their right arms. A region within two km from the aluminum refinery, polluted with fluoride (three to five ppb fluoride and 100 to 230 kg/sq km/month fluorine per atmospheric dust fall), and a town only slightly polluted by fluoride located six km away from the refinery were studied. The x-rays were classified according to the standard of the skeletal development determined by Greulich and Pyle. Comparative studies on region, sex, and school year were also done. Children in the polluted area were found a little behind in the development of carpal bones in the 5th and 6th grade and metacarpal and digital phalanx bones in the 6th grade. Low levels of fluorine in the air promote the skeletal development of 8 12 year old school children; however, in this study, such a tendency was not found. Such a tendency was found however, in the girls in the 8th and 9th grade in the junior high school in the polluted area. Thus, if fluorine had an influence upon the skeletal development, the influence is greater upon the smaller children, and varies according to the individual child. There was only a slight difference between the polluted area and non-polluted area. Therefore, pollution in this area does not have a serious influence upon the skeletal development of children.

13210 APTIC NO. 30310

Takayama, Otohiko

EFFECT OF AIR POLLUTION ON RESPIRATORY ORGANS. *(Taikiosen no kokyuki ni oyobosu eikyo ni tsuite). Text in Japanese. Nichidai Igaku Zasshi (Nichidai Med. J.), 30(2):83-88, Feb. 1971. 23 refs.*

Histological studies were made of the effects of air pollution on the trachea, the lung, and the upper respiratory tract. An epidemiologic study of the effect of air pollution on the upper respiratory tract was also conducted. Either phagocytal inflammation of the alveoli of the lung occurs, or the phagocytes accumulate in the pulmonary intestice, if particles remain in the alveoli when dust is inhaled. Whenever dust remains in the alveoli and the bronchioli, it brings about proliferation of the fiber. The extent to which contaminant particles remain in the lung is affected by various factors. In the case of an aerial contaminant, it varies according to the amount inhaled. Allergic contamination causes typical asthma-like changes. Pathological changes in the upper respiratory tract due to air pollution were observed; the effect of dust increased according to the order of the pharynx, the larynx, the trachea, and the lung. The effect of sulfur dioxide increased in the order of the pharynx, the trachea, the larynx, and the lung. With respect to objective findings observed macroscopically in the epidemiological investigation, the incidence of paranasal sinusitis, laryngitis, and pharyngitis were significantly higher in a polluted district than in a nonpolluted district. Also observed were the parts of the larynx and the pharynx where lesions were apt to occur more often. Finally, the movement of gargling water was observed by roentgeno-cinematography to determine whether gargling water could make the surface of the mucosa clean and which part of the pharyngeal cavity it reached.

13211 APTIC NO. 30894

Takizawa, Y., H. Sato, R. Nakagawa, N. Kanemaki, N. Otake, and C. Takahashi

INVESTIGATIONS ON THE EFFECTS OF AIR POLLUTION ON THE HUMAN BODY IN NIIGATA CITY. *(Niigata shi no taiki osen ni yoru jintai eikyo chosa). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):129, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, Tokyo, Japan, 1970.)*

One hundred and seventy-four women froma heavily polluted area of Niigata city and 183 women from a relatively unpolluted area of the same city were tested in 1968 and 1969 for possible influences of air pollution and their health. They were all forty years old or above and residents of the area for more than three years. The British Medical Research Council health examination was given to all, and vital capacity, breathing reserve, ventilation index, and various respiratory tests were carried out; 68.1% of the women received all the tests in the first year, and 52.7% for the second year. Chronic bronchitis in the polluted area was 6.52% and in the unpolluted area, 3.13%. Health histories and smoking habits showed no influence on the statistics. The results resembled those obtained from similar investigations carried out in Tokyo and Yokohama. The average vital capacity of women from the polluted area (2009 cc) was higher that that from unpolluted area (1980 cc). But the cases of respiratory complaints were far greater among the women from the polluted area. Pulmonary emphysema was 4.5% compared to 2.3% in the unpolluted area; coughing during winter months, 10.9% as against 5.2%; mucous discharge during winter, 23.9% as against 8.3% breathing difficulty, 14.1% as against 9.4%; coughing and discharge in certain weather, 20.7% as against 2.1% and cases of respiratory diseases (in bed for more than one week) in the past three years, 17.4% against 9.4%.

13212 APTIC NO. 30328

Terzuolo, D.

THE EFFECTS OF AIR POLLUTION DUE TO MOTOR VEHICLES ON MAN: A TOPICAL SOCIAL PROBLEM. *(Gli effetti dell inquinamento atmosferico causato da veicoli a motore sull organismo umano: un problema sociale di attualite). Text in Italian. Minerva Med., 61(87):4902-4906, 1970. 20 refs.*

Detriments to human health are caused by a number of constituents of automotive emissions: lead compounds, polycyclic hydrocarbons, carbon monoxide, nitrogen compounds, and disagreeable odors, the last having mostly psychological effects. Control of automotive emissions, must include administrative measures to guarantee the reduction of such pollution without imposing too heavy a burden on the public, the development of appropriate procedures and mechanical devices, surveillance of the environment and public health, and aspects of urban planning related to maximum dispersion of the undesirable emissions. The American cities of Chicago and New York have conducted extensive studies of carbon monoxide and nitrogen oxide in the atmosphere. The State of California in 1961 and the United States in 1966 passed legislation aimed at the reduction of carbon monoxide, hydrocarbons, nitrogen oxides, and particulate emissions from motor vehicles, particularly those that burn gasoline. Beginning January 1, 1966, diesel motor operating in Belgium were inspected in terms of the opacity of their exhaust. Other countries that have adopted standards for air purity are West Germany, Rumania, Czechoslovakia, and the Soviet Union. In Great Britain, the Road traffic Act of 1930 and the Road Safety Act of 1967 sets standards for the manufacture of vehicles, stipulating that a vehicle is not to be used in a way that will cause it to emit fumes, vapors, or solid particles resulting from incomplete combustion. Japan has fixed the maximum carbon monoxide concentration of automotive emissions at three percent, as of September 1966. A bill recently introduced in West Germany calls for a 4.5% ceiling for carbon monoxide in motor exhaust.

13213 APTIC NO. 30369

Toyama, Toshio

GENERAL REMARKS ON ATMOSPHERIC POLLUTANTS AND HEALTH. *(Taiki osenbutsu to kenko ni kansuru soron). Text in Japanese. Naika, 27(5):808-815, May 1971. 27 refs.*

The influence of atmospheric pollution on the human body is described with numerical data on the following items: the level of the pollutant that was measured (carbon monoxide, sulfur oxides, hydrocarbons, nitrogen oxides, carbon dioxide and smoke); the influence of sulfur dioxide and oxidized air pollutants on health and the influence of minute amounts of chemical elements and compounds. Studies have been made on the relationship between noxious substances and occupational diseases. However, there are few records on the relationship between atmospheric pollution in the general living environment and health. One of the functions that medical science will perform is to consolidate air quality criteria to establish environmental standards. Experiment programs in the past studied the noticeable health changes caused by highly concentrated substances. However, very few immediate effect experiments have been done which are necessary to establish environmental standards. In the future medical science must determine what the normal state is, if it is to counteract the effects of environmental pollution.

13214 APTIC NO. 30642

Toyama, Toshio and Hiroshi Momotani

STUDIES ON EFFECTS OF MINUTE AMOUNTS OF CO ON HUMAN BODIES. *(Biryoissankatanso no jintaieikyo ni oyobosu kenkyu). Text in Japanese. Keio Univ., Tokyo (Japan), School of Medicine. 19p., 1968 (?).*

The effects of minute amounts of carbon monoxide on human bodies were studied from experimental and epidemiological viewpoints. In the first part of experimental studies, CO concentrations in expired air and carboxyhemoglobin levels in the blood were simultaneously measured. Their interrelation proved that measurements of CO concentrations in the expired air can be substituted for measurements of the COHb concentration in the blood. An infrared analyzer and the micro-diffusion method were used in measuring the concentrations of CO and COHb, respectively. The interrelation between the CO concentration in the expired air and the COHb level in the blood showed sufficient efficiency for the study of chronic CO poisoning. In the following studies, therefore, expired air was used as the sample for measurements. To search for normal values of minute amounts of internally generated CO, variations in the CO concentration of expired air of human subjects were observed in an atmosphere which did not contain CO. To decide the normal values of CO concentration in the expired air, it was measured in 300 junior high school students for epidemiological studies. They were normal subjects less affected by CO. The same measurement was conducted on 100 junior high school and elementary school students who were rarely affected by CO. Carbon monoxide concentrations in the environmental atmosphere and in the expired air of human subjects were measured at an intersection with a heavy traffic volume. As a result of these studies, it was revealed that the human body expires about one ppm of internally generated CO. The concentration of CO in the expired air of healthy men living in a normal atmosphere (below two ppm of CO) seemed to be two to seven ppm. The CO concentration in the expired air at the intersection with a heavy traffic volume reached 20 ppm, even among non-smokers. This is four to ten times the normal value.

13215 APTIC NO. 30187

Tremonti, Lawrence P.

TOKYO-YOKOHAMA ASTHMA. *Ann. Allergy, 28(12):590-595, Dec. 1970. 14 refs.*

An evaluation of the clinical and laboratory characteristics of Tokyo-Yokohama asthma is presented. Thirty-one adults with symptomatic chronic wheezing noted for the first time while living in Japan were the subjects of this study. Evaluation of the patients consisted of a history and physical examination, complete blood count, chest x-ray, pulmonary function studies, and intradermal allergy skin tests. Nocturnal cough was usually the initial complaint followed by wheezing and mucoid sputum production. Symptoms were maximum in the late afternoon and evening hours and increased on days when air pollution was heaviest Cessation of smoking failed to arrest symptoms in any patient, although coughing was diminished. The persistent finding of blood eosinophilia and a high incidence of sputum eosinophilia suggest an allergic or hypersensitivity mechanism. Pulmonary function tests showed airway obstruction in all of the patients. Intradermal skin tests and chest x-rays did not show any significant abnormalities. It is concluded that Tokyo-Yokohama asthma is caused by the dense air pollution that is present in the Kanto Plains area of Japan.

13216 APTIC NO. 30849

Tsunetoshi, Yoshizo, Miyoko Ueda, Hisao Takahashi, Saburo Kajihara, Kotei Sakaki, Yasushi Nishiwaki, Tadahiko Shimizu, Noriko Nakayama, Akio Ichinosawa, Akira Ohshino, and Masakazu Ogino

ATMOSPHERIC CONTAMINATION OF INDUSTRIAL AREAS INCLUDING FOSSIL-FUEL POWER STATIONS AND A METHOD OF EVALUATING POSSIBLE EFFECT ON INHABITANTS. *Preprint, Osaka Center for Adult Diseases (Japan); Osaka Environmental Pollution Control Center (Japan); Osaka Prefectural Government (Japan), Public Health Dept., Kinki Univ., Higashi-Osaka (Japan), Atomic Energy Research Inst., 39p., 1970. 10 refs.*

NTIS: CONF-700-810-40

The environmental air quality standard for sulfur dioxide in Japan, data on atmospheric contamination of the Osaka area including fossil-fuel power stations, and a method of evaluating the possible effects of contamination on human health were discussed. During 99% of more of the total number of hours throughout the year, the concentration of sulfur dioxide should be maintained at 0.2 ppm. The average concentration per day should be maintained at 0.05 ppm for 70% of the time. The yearly average should not exceed 0.05 ppm. In Osaka prefecture, the dust fall is decreasing, but there is still an increasing sulfur dioxide concentration. The decrease in dust fall may be due to a change of factory fuel from coal to oil. Air pollution monitoring in Osaka is accomplished with 20 fixed stations. Sulfur oxides, suspended particulates, wind direction, wind velocity, temperature, and humidity are measured. In addition, mobile units measure carbon monoxide, total hydrocarbon, and nitrogen oxides. Data are transmitted through a telemetering system. A method for evaluating the effects of air pollution on human health showed that the prevalence of chronic bronchitis should increase by about two percent with the increase of observed sulfur oxides precipitation rate by one mg/ day/100 sq cm. In the analysis, a linear relationship was assumed between the prevalence of chronic bronchitis and the sulfur oxides precipitation rate for a certain range of contamination level after normalization of other factors.

13217 APTIC NO. 30395

Ueda, Kazuo and Tsutomu Eibihara

RICKETS IN INFANTS IN THE JURISDICTION OF KOJIYA HEALTH CENTER. (SECOND REPORT). *(Kojiya hokensho kannai nyuji no kurubyo ni tsuite. (Dai II ho). Text in Japanese. Koshu Eisei Joho (Public Health Inform.), 1(1):24, April 1971.*

The relationship between air pollution and rickets in infants was investigated in the jurisdiction of the Kojiya Health Center, a highly polluted district of Tokyo. The examination was performed four times from 1968 to 1969. The subjects were three or four month-old babies, numbering 2660 in 1968 and 2673 in 1969. The cup-shaped change seen in the distal edge of the ulna and the radius by x-ray examination of the carpal bones was defined as a rickets change. Air pollution in this district has been severe since 1965; in 1967, the amount of ultra-violet radiation decreased to two thirds of that in the suburbs. Large amounts of lead, manganese, and chromium were found in the dust fall of the area. The cup-shaped change in the distal edge of the ulna was seasonally independent in about seven percent of the infants who were born since 1966. It was not found at all among infants who were exposed to the sun for 30 min/day since one or two months after their birth. The infants with low birth weight or purely artificially fed infants showed a tendency for the cup-shaped change. Measured values of alkaline phosphatase and inorganic phosphorus in infants with rickets were within a normal range; those of calcium and phosphorus were also within normal limits.

13218 APTIC NO. 30241

Ulmer, W. T. and G. Reichel

THE EPIDEMIOLOGY OF CHRONIC BRONCHITIS AND ITS RELATIONSHIP TO AIR POLLUTION. *(Zur Epidemiologie der chronischen Bronchitis und deren Zusammenhang mit der Luftverschmutzung). Text in German. Deut. Med. Wochschr., 95(51):2549-2554, Dec. 18, 1970. 58 refs.*

An epidemiological study on the prevalence of chronic bronchitis in 8162 persons showed that the incidence of ordinary chronic bronchitis increases with increasing age. Significant differences in the incidence of bronchitis were not found between urban areas of the Ruhr, some of them with severe air pollution, a small town, and a rural district. Obstructive bronchitis was much less common than simple bronchitis. The number of patients requiring intensive treatment was high at three percent; the prevalence of all forms of respiratory tract obstructions rose from three percent to over 14% with increasing age. Smoking was a causal factor in the severe forms of obstructive bronchitis; however, it increased in relationship to age in nonsmokers also. Daily sulfur dioxide readings were taken in the morning and evening. There was no correlation between general air pollution and the prevalence of respiratory tract obstruction. Simple bronchitis occurred more frequently in men than in women, but respiratory tract obstruction had the same prevalence in the two sexes. No conclusion was reached as to the role of air pollution in the course of chronic obstructive bronchitis. (Author abstract modified)

13219 APTIC NO. 30898

Wada, T., N. Uchima, K. Kono, and O. Takayama

THE STUDY OF THE CHRONIC PHARNYGS-LARYNGITIS IN AIR POLLUTED DISTRICT. SPECIALLY ON THE AIR BORNE. *(Taiki osen chiku ni okeru mansei inkotoen no kenkyu). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):133, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, Tokyo, Japan, 1970.)*

The citizens of Kawasaki area who complained of some form of discomfort in their throat were studied. The area had an average of 34.26 t/sq m/month settling particulates in 1967; the heaviest was 42.26 t/sq m/month from June through September. These amounts are four times as large as that of residential areas. In summer, a south wind brings particulates from the coastal industrial areas to northern industrial, commercial, and residential areas; in winter, a north wind carries them toward the sea. The least number of complaints, were made in December, January, and February. The number of throat patients increased as their age increased; the largest number was persons in their forties. Subjective symptoms in records included abnormal discomfort, husky voice, mucous residue in throat, and dry mucous membrane. Objective symptoms were angiectasis and lympha follicle formation in the back of throat, blanching of mucous membrane, and reddening of vocal cords. In addition, 36% of males and 45% of females were allergic. Twelve allergen inhaling tests showed that 62%

of males and 69% of females were positive; but among them, 91% males and 89% females reacted to eumycetes. The amount of eumycetes in the air was studied for a year. Penicillium, aspergillus, and cladosporium were found in all areas, but candida was seen positively more in industrial and commercial areas than in residential areas. Allerge skin tests showed no sexual difference in positives in industrial and commercial areas, but men who lived in residential areas and commuted to industrial or commercial areas showed a distinctively more reaction to candida than women who stayed in residential areas Clinical observation also revealed that objective symptoms are especially notable in the male patients who live in residential areas.

13220 APTIC NO. 30855

Wagner, J. C.

THE PATHOGENESIS OF TUMORS FOLLOWING THE INTRAPLEURAL INJECTION OF ASBESTOS AND SILICA. *National Cancer Inst., Bethesda, Md. and Atomic Energy Commission, Washington, D. C., Proc. Conf. Morphol. Exptl. Respirat. Carcinogenesis, Gatlinburg, Tenn., 1970, p. 347-358. 8 refs. (May 13-16.)*

NTIS: CONF-700501

The inhalation of asbestos dust has been associated with the development of pleural and peritoneal mesotheliomas in man. Since experiments had shown that similar tumors could be produced in rats by intrapleural inoculation of several different types of asbestos, a series of experiments was then undertaken to determine if a particular type of fiber or other material could be implicated in the production of the tumors. Early results showed that chrysotile and crocidolite dust produced a high rate of tumors and that the extraction of the oil from the crocidolite had no effect; fewer neoplasms occurred with amosite. The chrysotile used was futher studied, first by comparing variation in dosage with the crocidolite and then by comparing with chrysotile samples from seven Canadian mines. All the dusts produced tumors, and the possible physical and chemical chracteristics which may account for the difference are being investigated. The reference samples, which were produced as a recommendation of the Union for International Control of Cancer Working Party on Asbestos and Cancer as a basis for further studies, have been inoculated intrapleurally and used in inhalation experiments. Since it was suggested that the reference samples had become contaminated by oils due to being stored in plastic bags, oil-free samples have been used as controls in the intrapleural studies. In addition, silica, which had been used as a control dust in the original experiments, produced a series of tumors, the nature of which required a separate study. A summary of these findings is included. (Author abstract)

13221 APTIC NO. 30356

Watanabe, Hiroshi, Hisako Murayama, Shigeo Yamaoka, Osamu Fukase, and Shinto Chin

A STUDY OF EFFECTS OF AUTOMOBILE EXHAUST GASES ON HUMAN BODY. *(Jidosha haikigasu no jintai ni oyobosu eikyo ni kansuru kenkyu). Text in Japanese. Osaka Municipal Office (Japan), Inst. of Hygiene, 153p., March 1970. 31 refs.*

A long-term experiment of rats and mice exposed to very small amounts of sulfur dioxide and carbon monoxide was conducted. In the first and second experiments (0.1 and 0.5 ppm SO2 for 30 days), the animals developed chronic bronchitis like symptoms. In the third experiment, the animals were exposed to 0.5 ppm SO2 for three months and to urban-type air pollution (daily average of 0.10 ppm SO2 with a peak concentration of 0.3 0.5 ppm for 3 hours) for three months. They were studied as to patho histological changes of respiratory organs, changes of body weight, suprarenal glands, and amounts of reduced glutathione. Two days exposure to 5 ppm SO2 for seven to nine hours was carried out to confirm pathohistological and morphological changes and enzymatic histochemical changes caused by the chronic disease obtained in the third experiment. The result of the third experiment revealed that the rats had nasal bleeding from the beginning, and an infectious disease of respiratory organs was suspected; Therefore, a relationship between the third and the last experiments could not be acquired. Dilatation of the alveolar cavity was present in the experiment of urban-type air pollution. The relationship between patho-histological findings and enzymatic histochemical findings caused by SO2 was proven to be a proportional one. In the experiment in which the animals were exposed to CO, priority was given to a study of patho-histological changes in the cerebral nerve tissue. The animals were continuously exposed to 1000 ppm CO for five to six hours daily during 11 14 days, and to 500 ppm CO during seven days. As a result, cerebral and cerebellum congestion, and atrophic deformity in the nerve tissue were proven. Coproporphyrin in the urine was examined, but individual differences of the amount were so large that no conclusions could be reached. A study with gas chromatography concerning a method for the continuous analysis of low hydrocarbons in the atmosphere was reported.

13222 APTIC NO. 30643

Watanabe, H., H. Murayama, S. Yamaoka, O. Fukase, and S. Chin

ANIMAL EXPERIMENTS OF LONG TERM EXPOSURE TO SO2 AND CO GAS. *(SO2, CO ni taisuru choki bakuro dobutsu jikken). Text in Japanese. In: Studies on Effects of Automobile Exhaust Gases on Man. Osaka City Inst. of Hygiene (Japan); Kyoto Prefectural Univ. of Medicine (Japan), p. 1-83, March 1969.*

Animal experiments were conducted to study the hygienic environmental standard for automobile exhaust gases. Young rats housed in three chambers, were continuously exposed to 0.1 ppm sulfur dioxide, 0.5 ppm SO2, and clean air treated with activated carbon, respectively, for 30 days. The VB1(7) contents in the organs and patho-histological changes in the respiratory tract were observed. No effects were observed on VB1 metabolism, but the respiratory tract showed inflammatory findings similar to those of chronic bronchitis. To confirm these results, young rats and mice were kept under conditions similar to the air pollution in urban cities; they were exposed to 0.05 ppm SO2 for 20 hours a day or to 0.3 0.5 ppm SO2 for three hours a day for three months. Effects on the trachea, the bronchi, the lung, and the liver were biochemically and pathohistologically studied. The results are now being prepared for publication. For the CO exposure experiments, rats were exposed to 1000 ppm CO for five hours a day for 11 14 days and to 500 ppm CO for 24 hours a day for a week. The acute effects on the brain and nervous system were studied. To observe chronic effects, changes in the VB1 metabolism and the brain cells of rats exposed to 30 ppm and 100 ppm CO for 21 45 days were investigated. Blood congestion in the brain tissue and cells was seen as an acute effect. This change became clearer at higher CO concentrations. In the case of exposure to 30 ppm CO, a similar effect was observed, but changes in the brain cells were not seen, although there was blood congestion. An effect on VB1 metabolism by chronic exposure to CO was not observed.

13223 APTIC NO. 30145

Weigand, Walter

STUDIES OF THE INHALATION TOXICITY OF THE FLUORINE DERIVATIVES OF THE METHANE, ETHANE AND CYCLOBUTANE. *(Untersuchungen ueber die Inhalationstoxizitaet von Fluorderivaten des Methan, Aethan und Cyclobutan). Text in German. Zbl. Arbeitsmed., 21(5):149-156, 1971. 10 refs.*

Acute and chronic inhalation tests were performed on rats, guinea pigs, cats, and beagles with chlorotrifluoromethane (CClF3), chlorodifluoromethane (CHClF2), bromochlorodifluoromethane (CBrClF2), 1-chloro-1, 1-2,2,2-pentafluoroethane (CClF2-CF3), carbon fluoride (C4F8,), and dichlorofluoromethane (CHCl2F). The acute inhalation tests (one exposure for two hours) on rats and guinea pigs showed that CClF3, CClF2-CF3, and C4F8 caused no injuries even when a dose of 60% by volume was inhaled. Chlorodifluoromethane caused no injuries in rats to a concentration of 2.5% by volume and in guinea pigs to five percent. The limit concentration for CBrClF2 was five percent by volume for rats and 10% for guinea pigs. For CHCl2F, the limit concentration was one percent by volume. In the chronic experiments, the animals were exposed to the fluorine derivative/air mixture five days a week for three and one half hours per day. The experiments lasted four weeks. The total inhalation time was 70 hours. The concentrations ranged from 20% by volume for CClF3, CClF2-CF3, and C4F8 to between 2.5 and 7.5% by volume for CBrClF2. With the exception of CHCl2F and CBrClF2, no injuries were caused by the fluorine derivatives. None of the derivatives attacked the respiratory tract.

13224 APTIC NO. 30353

Yoshida, Katsumi

EFFECTS OF AIR POLLUTION ON HUMAN BODY. *(Taikiosen no jintai eikyo). Text in Japanese. Kyoto Igakkai Zasshi (J. Kyoto Med. Assoc.), 20(2):19-25, March 1971. (Presented at the Kyoto Medical Association, Scientific Lecture Meeting, Sept. 19, 1970.)*

A review of the health effects of sulfur dioxide, nitrogen dioxide, and carbon monoxide is presented. Sulfur dioxide is a a representative contaminant in Japan today. As a result of long term exposure to SO2 at the present atmospheric concentration, an increase of inflammation, mainly bronchitis, has been reported by epidemiological and experimental research. Inhibition of ciliar movement of the epithelium cells in the bronchial wall is indicated as a reason for this increase. Also, the SO2 has a high degree of deposition and retention in the lungs. There are not many areas where nitrogen dioxide is the overwhelming contamination factor, its epidemiological effects are not clear. From long-term exposure experiments using minute amounts of NO2, it was concluded that this pollutant may cause obstructive lung disease in the same way SO2 does. The influence of carbon monoxide is completely different from that of SO2 and NO2. Carbon monoxide has a strong affinity for the hemoglobin in the blood. Once CO has combined with hemoglobin, it is very difficult to release; it inhibits the action of Hb, thereby causing cerebral disorders. Carboxyhemoglobin is also harmful to the patient with ischemic heart disease. The environmental standard of CO should be made taking these factors into consideration.

13225 APTIC NO. 30169

Yoshida, Ryo, Takeshi Hongu, Motoaki Adachi, Kozo Ito, Masatsugu Kubo, and Shigeru Funabashi

THE RESULTS OF THE MEDICAL EXAMINATION ON THE INFANTS IN TWO AREAS IN FUJI CITY, SHIZUOKA PREFECTURE. *(Shizuoka-ken Fuji-shinai 2 chiku no nyuyoji kenshin kekka). Text in Japanese. Shoni Hoken Kenkyu (J. Child Health), 29(2):108-109, Jan. 1971. (Presented at the Japanese Society of Child Health, Annual Meeting, 17th, Kurume, Japan, Oct. 16-17, 1970.)*

Fuji city, which developed around the paper manufacturing industry, has many environment problems, including air pollution, water pollution, and offensive odors. In the Fujima and Iwai districts, which are located near a large paper manufacturing plant, children under seven years of age were sampled (73 infants from Fujima and 294 infants from Iwai) and tested by the Fuji city doctors committee. The investigations were carried out in June, 1969, at Fujima, and in June, 1970, at Iwai. Susceptibility to colds was 80% in Fujima, 68.5% in Iwai; 33.9% and 18.1% had asthmatic spasms within a year; and 20.2% and 11.2% had difficulty in breathing within a year. On the basis of the first examination some infants were required to take a more thorough examination in Fujima, 37 children (56.9%) and in Iwai 71 (27.3%). The results showed a prevalence of bronchial asthma (six children in Fujima (9.2%) of those who had the first examination) and five children in Iwai (1.9%) and the first stage of bronchial asthma in 17 (26.1%) and 25 (9.6%) children. Continued observance is considered necessary for 46% of the Fujima children and 20% of the Iwai children who had the first examination.

EFFECTS-PLANTS AND LIVESTOCK

13226 APTIC NO. 30637

Chiba Prefecture (Japan)

AIR POLLUTION AND PLANT DAMAGE WITH SPECIAL REFERENCE TO THE DAMAGES OF PEAR TREES IN ICHIHARA DISTRICT, CHIBA PREFECTURE. *(Taikiosen to shokubutsu higai -Chiba-ken Ichihara chiku no nashi no higai o chushin toshite). Text in Japanese. 158p., March 1968.*

The causes of plant damage between 1965 and 1966 in Ichihara City, Chiba Prefecture were investigated and countermeasures were examined. Damage was seen in pear orchards, street trees, and shrubs located near an oil-refinery, petroleum chemical factories, and a steam-power plant, which mainly use heavy oil. Damage to peaches was frequent at the time of flowering and expansive growth, when the resistance to sulfur dioxide was greatest. The time that the damage occurred agreed with the time when the concentration of SO2 was high. Therefore, damage was mainly due to SO2. Damage to pear trees sprayed with the coal Bordeaux mixture was also observed. However, damage by agricultural chemicals had never been seen, so the relationship between such phenomena was investigated. Decidious broad-leaved trees are easily affected, and evergreen broad-leaved trees are relatively resistant. A correlation was observed between the damage and the direction of flying contaminated substances. The damage was heavy in the cases of a north wind, rainy weather, smog, stagnant air current, and successive fine weather. The relationship between damage and these elements was investigated. The occurrence of damage in 1965 and 1966, possible causes, countermeasures, and results were discussed.

13227 APTIC NO. 30880

Anderson, Paul J.

THE EFFECT OF DUST FROM CEMENT MILLS ON THE SETTING OF FRUIT. *Plant World, 17(3):57-68, 1914. 1 ref.*

Fruit growers in the vicinity of Hudson, New York, in the spring of 1910 complained that their crops were seriously damaged by dust from large cement mills which had recently been located there. They noticed particularly a decrease in the amount of fruit that was set on trees within the dust zone. Investigations were undertaken to determine the nature and extent of the alleged injury and, if possible, to find a remedy. Dust from the cement kiln stacks was found to settle on the vegetation within a radius of two miles from the mills. This dust contained a large amount of alkaline, soluble calcium salts. When the dust falls on the fruit blossoms some of it goes into solution in the stigmatic secretions and pollen falling on the stigma will not germinate. This the flowers will not be fertilized. Artificial germination tests show that pollen will not germinate even in very weak solution of the dust. When the blossoms are dusted as fast as they open, only a very small percentage sets fruit. (Author summary modified)

13228 APTIC NO. 30322

Fritz, W. and R. Engst

ENVIRONMENTAL FOOD CONTAMINATION WITH CARCINOGENIC HYDROCARBONS. *(Zur umweltbedingten Kontamination von Lebensmitteln mit krebserzeugenden Kohlenwasserstoffen). Text in German. Z. Ges. Hyg. Grenzg. (Berlin), 17(4):271-275, 1971. 31 refs.*

Vegetable and soil samples were examined to determine the extent and sources of environmental food contamination with carcinogenic hydrocarbons. The samples were first dried at 40 C. The polyaromatics were concentrated by solid-liquid extraction with benzene, column chromatography, and thin layer chromatography on silica gel. The 3,4-benzopyrene group was further analyzed by thin layer chromatography on acetylized cellulose (methanole:ether:H20 was 4:4:1). After elution, the polyaromatics were determined by ultraviolet and fluorescent spectrophotometry. The degree of food contamination was parallel to the degree of soil contamination. The concentration of polyaromatics in the soil samples rose with an increasing traffic density, and primarily, it was dependent on the amount of industrial emission. In areas with low traffic density and little industry the 3,4-benzopyrene content of five to 700 microgram/kg was relatively low. At a busy intersection the benzopyrene concentration rose to 3000 microgram/kg and in the vicinity of industries it rose even higher. On the premises of a manufacturing plant for lampblack, the 3,4-benzopyrene concentration in the soil samples reached 650,000 microgram/kg. In salad a maximum concentration of 150 microgram 3,4-benzopyrene/ kg dry substance was measured.

13229 APTIC NO. 30315

Giddens, W. E., Jr., C. K. Whitehair, and S. D. Sleight

NITROGEN DIOXIDE (SILO GAS) POISONING IN PIGS. *Am. J. Vet. Res., 31(10):1779-1786, Oct. 1970. 25 refs.*

The composition of silo gas and its effects on pigs were investigated and comparison was made of lesions of silo gas toxicosis in pigs and those described for silo-filler s disease in man. Caged pigs were exposed for varying periods to silo gas by placing them in recently filled silos or within an enclosure formed with plastic sheets at the bottom of a silo chute. Pigs inhaling a high concentration of silo gas for periods longer than 10 min died in 21-72 min. As determined by mass spectrometer analysis, the composition of the silo gas was 0.173-9.05% carbon dioxide, 0-140 ppm nitric oxide, and 8-360 ppm nitrogen dioxide. In pigs dying from inhaling silo gas, the early lesions were pulmonary alveolar edema and hyperemia. Large amounts of alveolar fibrin were present in pigs that survived the longest. In addition, there were hemorrhage, bronchiolor, and bronchial epithelial desquamation, and perivascular, interlobular, and subpleural edema. Pigs surviving the acute effects of silo gas toxicosis did not develop bronchiolitis fibrosa as described for silo-filler s disease in man. (Author abstract modified)

13230 APTIC NO. 30298

Guderian, R.

FINDINGS FROM GASSING EXPERIMENTS FOR DETERMINATION OF PLANT - DAMAGING HF CONCENTRATIONS. *(Ergebnisse aus Begasungsexperimenten zur Ermittlung pflanzenschaedigender HF-Konzentrationen). Text in German. VDI (Ver. Deut. Ingr.) Ber., no. 164:33-37, 1971. 2 refs.*

Extensive experiments have been conducted to determine the effect of hydrofluoric acid gas concentrations on plants. The experimental set-up consists of miniature grennhouses in the form of chambers with walls made of plastic sheet, into which rarefied HF-air mixtures are brought from a generating room via plastic piping mounted below ground. Atmospheric air enters through the roofs of the chambers, drawn in by the suction effect of the piped- in mixture. A change of air is thus effected 100 times per hour, and the fluctuations in temperature and humidity inside the chamber follow those of the outer air. The experiments were made with HF concentrations between 0.85 and 25 micrograms/cu m of air. Among the forest cultures, some varieties of fir, spruce, ash, and beech show already after ten days of exposure to average gas concentrations of 1.3 micrograms/cu m of air such distinct damage to needles and leaves that one has to expect drastic retardation of growth in case of exposure for several months or years. The symptoms of damage observed were necrosis on needle tips and blade edges. Fodder plants, particularly varieties of grass and clover, were tested after 16 days exposure to gas of 0.85 and 2.60 micrograms HF/cu m air, respectively. The ensuing enrichment of fluorine in the plants was up to 9 mg F per 100 g dry substance with the weaker HF concentration, and up to 22 mg F per 100 g dry substance with the stronger HF concentration. Visible damage on the clover leaves occurred in the form of chlorosis and in rarer cases necrosis of leaf parts. A table of resistivity of a number o tree, plant, flower, and vegetable varieties to HF effects is shown comprising the very sensitive ones, the sensitive and the less sensitive species. Lasting damage to plants can be caused already by very low HF concentrations in the atmosphere in case of long exposure.

13231 APTIC NO. 30443

Hasek, Raymond F., Howard A. James, and R. H. Sciaroni

ETHYLENE – ITS EFFECT ON FLOWER CROPS. *Florist s Rev., 144(3722):16-17, 53-56, April 3, 1969, and 144(3721):21, 65-68, 79-82, March 27, 1969. 50 refs.*

Selected references are drawn upon to give a concise background of the ethylene problem as it relates to floriculture. Sources of the gas are mentioned, along with possible solutions at various industrial levels. Also, ethylene can be given off by the plants themselves. Fungi can be a source of ethylene, as well as the natural decay of organic matter, especially under the confined conditions of florist s refrigerators. The area around greenhouses must be kept clean at all times, and disease organisms, insects, and other sources which could cause ethylene damage to cut flowers and potted plants must be controlled. Growers must continue to press plant breeders for more ethylene tolerant varieties so that the susceptible ones can be phased out. Better economical exhaust control devices for automobiles and trucks must be sought.

13232 APTIC NO. 30471

Heck, W. W. and D. T. Tingey

OZONE; TIME-CONCENTRATION MODEL TO PREDICT ACUTE FOLIAR INJURY. *Preprint, Environmental Protection Agency, Raleigh, N. C., Air Pollution Control Office, 23p., 1971 (?). 17 refs.*

An understanding of the response of plant species to specific doses of an air pollutant or a group of pollutants is essential before air quality standards can be established in areas under crop production. An experimental design was developed utilizing five time periods from 0.5 to seven hours with two ozone concentrations at each time period. Concentrations were chosen that would produce threshold and severe injury at the time periods in question. From these data for each species, and equation was developed utilizing concentration as the dependent variable, and both foliar injury and time as independent variables. The model allows for the development of a three-dimensional response surface within the limits of the times and concentrations used. The model should be of practical importance in predicting the concentration of ozone that will produce a given amount of injury to a specific crop during a single 12-hr day. Research to date suggests the model may be used for other pollutants and for other plant species that show injury following exposure to high ambient ozone concentrations. (Author abstract modified)

13233 APTIC NO. 30269

Howell, Robert K.

INFLUENCE OF AIR POLLUTION ON QUANTITIES OF CAFFEIC ACID ISOLATED FROM LEAVES OF PHASEOLUS VULGARIS. *Phytopathology, 60(11):1626-1629, Nov. 1970. 15 refs.*

An investigation was conducted to determine if polluted air containing primarily photochemical oxidants alters phenol metabolism in bean leaves, and to identify and measure O-diphenols in healthy leaves from plants cultured in activated carbon-filtered air and in injured leaves from plants cultured in nonfiltered air. Plant materials underwent paper chromatographic analyses. Primary bean leaves were severely injured by the components of nonfiltered air. Total oxidants are suspected to be responsible, since severity of injury paralleled the concentration of total oxidant measured. Fluorescent compounds were concentrated in the reddish-brown leaves. Caffeic acid concentrations were present in injured leaves at twice the concentration detected in healthy leaves. The presence of elevated levels of caffeic acid could contribute significantly to the biochemistry of the browning reaction noted in oxidant damaged leaves. The actual role of caffeic acid in the development of the symptoms caused by air pollution injury to plants is being studied.

13234 APTIC NO. 30816

Inoue, T., H. Ohno, and Y. Doi

RESPONSES OF TREES TO AIR POLLUTION. *(Taiki osen ni yoru jumoku higaijidosha haiki gasu no higai). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1): 157, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, Tokyo, Japan, 1970.)*

The effects of automobile exhaust gas on red pine, cherry, and zelkova tree seedlings was observed in special glass chambers for a period of 48 hrs (six hours a day for eight consecutive days) during June and July. Exhaust gas, diluted by factors of 10, 100, and 500 was emitted from an automobile with 1200 cc exhaust capacity. The engine was rotated at 800/min at all times, and the same type fuel was used for all the experiments. The test material in control chambers continuously received fresh air. The temperature of all chambers was kept at 28 C during the day and 20 C at night. Red pine did not manifest a notable effect, but the tips of some young leaves were dehydrated and curled up in the chamber of 10% and one percent dilution. The tips of some young leaves of the cherry were somewhat discolored, and some mature leaves had brown spots. The edges of zelkova leaves in 10% dilution turned brown and dropped out several days after the completion of the test. No visible change was detected in the chambers of one percent and 0.2% dilution, but young leaves withered. Water content in the leaves of red pine and cherry showed no special change, but the red pine leaves showed difficulty in stomata function. The trees manifested a relatively low sensitivity to exhaust gas in spite of the high concentration. No clear cut results were obtained outside the minor changes on cherry and zelkova in the 10% gas. However, a biological change of trees in relation to water content was detected.

13235 APTIC NO. 30810

Kadota, M. and H. Yamada

EFFECT OF OZONE ON SOME PINE NEEDLES. *(Ozon no akamatsu oyobi kuromatsu be ni oyobosu eikyo). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):158, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, Tokyo, Japan, 1970.)*

Ozone was diluted by a given amount of air and introduced into small test boxes in which were placed branches of red and black pines. Tests were usually carried out between 9:30 and 15:30, adding fluorescent light to create at least 10 Klux on rainy or cloudy days. Visible damage and chlorophyll a and b were measured by photocolorimetry every 30 min during the test period. In the experiments carried out in March and April, the ozone concentration and the time of the first visible damage on pine needles from the previous year showed a linear relationship. But the experiments on first-yr leaves (new leaves) in June and July showed considerable fluctuation due to the vigorous growth and individual biological pattern of development in young leaves in summer. Setting aside the age of pine needles, the red pines showed the first visual damage in approximately 20 to 25 hrs at 0.2 ppm ozone in spring, but the same damage was observed in two to five hours in summer. Ozone seems to have caused a considerable decrease in chlorophyll by the time visual damage was effected. The black pine showed slighly more endurance than the red pine.

13236 APTIC NO. 30801

Maeno, Michio

EFFECTS OF AIR POLLUTION ON TREES (VI) HEAVY METALS IN LEAVES OF STREET TREE AND MANGANESE. *(Jumoku ni taisuru taiki osen no eikyo (dairoppo) Gairyojuyo no jukinzoku. Tetsu oyobi mangan). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):155, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, Tokyo, Japan, 1970.)*

Iron and manganese content resulting from air pollution was examined in trees bordering highways between Yokohama and

Kawasaki between May and June in 1967. Chloric solution of ash from 74 trees (11 species) from 59 locations were separated into various metal classes by the atomic absorption method. Metallic content, location, and the relationship of the content with the insolubles on the leaf surface were examined. Further periodical checks were made in 1968 and 1970: the average increase in iron values in leaves in three years was greater in ginko (380 to 2820 ppm) and in sultan s parasol (640 to 3160 ppm). Others such as Carolina poplar (310 to 710 ppm) and willow (340 to 770 ppm) showed relatively low values and little change. In all categories, higher metal values were detected in trees in industrial areas than those in commercial or residential areas. Geographical differences were especially manifest in ginkoes and sultan s parasols. Both manganese and iron values in May and June were relatively low and much higher after July. The iron content in ginko showed a 10% drop between 1967 and 1970, and the manganese content a 20% drop. Part of heavy metal in tree leaves was obviously absorbed from the soil, but a large part of metal content seemed to have come from the soil, but a large part of metal content seemed to have come from the insoluble dust particles from the leaves in polluted industrial areas.

13237 APTIC NO. 30802

Maeno, Michio

EFFECT OF AIR POLLUTION ON TREES (VII) HEAVY METALS IN LEAVES OF STREET TREE. ZINC AND COPPER. *(Jumoku ni taisuru taiki osen no eikyo (dainanaho) Gairojuyo no jukinzoku. Aen oyobi do). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):156, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, Tokyo, Japan, 1970.)*

Zinc and copper values in trees were examined. The zinc content in ginko was 15-17 ppm; in sultan s parasol, 40-220 ppm; in Carolina poplar, 100-300 ppm; and in willow, 30-430 ppm. The fluctuation of zinc values in comparison to other metal values seemed larger in general, but especially in willow and sultan s parasol. All trees showed higher zinc values in the industrial area; they were 60-90% (commercial areas) and 30-60% in (residential areas) of those in the industrial areas. Copper value differences were smaller in comparison to manganese or zinc value fluctuations. Copper content in ginko was 10-45 ppm; in sultan s parasol, 20-60 ppm; in Carolina poplar, 15-20 ppm; and in willow, 10-15 ppm. Periodical checks showed that ginko trees in all areas but especially those in the Kawasaki industrial area increased their zinc values greatly in August and September. Ginko s zinc and copper content decreased in all areas between 1967 and 1970; zinc content decreased 40% and cooper content 20%. The heavy metal content in the insoluble material on tree leaves in 1968 included 210-890 ppm zinc and 250-760 ppm copper, and indicated a great geographical difference.

13238 APTIC NO. 30266

Manning, W. J., W. A. Feder, P. M. Papia, and I. Perkins

INFLUENCE OF FOLIAR OZONE INJURY ON ROOT DEVELOPMENT AND ROOT SURFACE FUNGI OF PINTO BEAN PLANTS. *Environ. Pollut., 1(4):305- 312, April 1971. 23 refs.*

Chronic exposure of Pinto bean plants to 0.1-0.15 microliter/l ozone caused foliar injury that adversely affected shoot and root growth and vigor and enhanced senescence. These effects were reflected in quantitative rather than qualitative differences in the successional root surface fungi. More fungal colonies were consistently isolated from the roots and hypocotyls of plants exposed to ozone than from those grown in charcoal-filtered air. Roots and hypocotyls of plants exposed and not exposed to ozone were colonized by the same fungi and each had the same general microflora at each sampling period. Rhizobium nodules were found on the roots of plants grown in charcoal-filtered air, but not on the roots of plants grown in the ozone chamber. (Author abstract modified)

13239 APTIC NO. 30234

McCune, Delbert C. and Leonard H. Weinstein

METABOLIC EFFECTS OF ATMOSPHERIC FLUORIDES ON PLANTS. *Environ. Pollut., no. 1:169-174, 1971. 25 refs.*

The metabolic effects of atmospheric fluorides on plants are reviewed. Results of studies on the effect of the pollutant on individual enzymes in vitro, isolated plants or plant parts, enzyme activities, pool sizes of various metabolic intermediates in fumigated plants, or physiological processes such as photosynthesis or respiration in plants exposed to atmospheric fluorides are discussed. Each approach yields important information, but the results must be interpreted in the light of the characteristics and limitations of the systems employed. Fluorides may act as metabolic inhibitors in a process in which the pollutant reacts with a metabolically active site to render it inactive. Presumably this site is in enzyme, although coenzymes or activators may be targets of the pollution. The inhibition of the enzyme results in an inhibition of the reaction mediated by that enzyme. The degree of inhibition depends on the concentration of the inhibitor at the active site, and this in turn depends on the amount and distribution of the inhibitor within the cell. (Author abstract modified)

13240 APTIC NO. 30878

Peirce, George J.

AN EFFECT OF CEMENT DUST ON ORANGE TREES. *Plant World, 13(12):283-288, Dec. 1910.*

In the San Bernardino Valley in Southern California, the principal occupation of the people is the growing of citrus fruits, but with the very rapid increase in the use of cement, cement manufacturing plants have been established and operated in this valley, as well as elsewhere. Particles of dust falling on the smooth and glossy upper surface of the shiny leaves of these citrus fruit trees, accumulate after a time into a layer of considerable thickness; these particles cohere and set in dew or fog or gentle rain, adhering to the surface of the leaf to rather a surprising degree. Such an opaque crust interposed as a screen over the upper surface of the leaf cannot fail to reduce the amount of light entering the leaf. If the manufacture of non-nitrogenous food is interfered with, all the other activities of the plant are correspondingly affected. This decrease in the amount of food made daily in the leaves of orange and lemon and grape fruit has resulted in a decreased yield, as well as in a decreased growth of the trees.

13241 APTIC NO. 30142

Quellmalz, Eberhard and Walter Oelschlaeger

FLUORINE CONCENTRATION OF THE AIR AND PLANTS IN THE VICINITY OF A BRICK KILN. *(Fluorgehalte von Luft und Pflanzen in der Umgebung einer Ziegelei). Text in German. Staub, Reinhaltung Luft, 31(5):206-208, May 1971. 11 refs.*

Brick kilns emit fluorine in the form of hydrogen fluoride and silicon fluoride. This is particularly true when the crude material contains many fluorine and few alkaline components. Emission measurements were taken with impingers in the vicinity of a brick kiln. In the period from May to August, 49 air samples were taken and the fluorine content was determined. Average concentrations of 1.4 to 6.9 microgram /cu m were determined. In 1968, Bergerghoff units were set up in which gaseous fluorine and fluorine-containing particles were collected. In rural areas the fluorine concentration amounted to 0.1 mg/sq m/day; a maximum concentration of 7.44 mg/sq m/day was found in the vicinity of the brick kiln. Examination of grape leaves revealed that the fluorine concentration rose gradually during the growing season, from 4.2 mg/100 g dry substance on the first of July to 23.5 mg/100 g dry substance on the last day of October. In leave samples from rural areas, the concentration was 1.2 mg/100 g dry substance. In the foliage of peas and string beans, a 10-fold fluorine concentration was found, in spinach a 9-fold, and in lettuce, a 20-fold concentration of that found in the rural areas. No direct correlation between the fluorine content of the leaves and the leaf injuries could be determined.

13242 APTIC NO. 30297

Scholl, G.

IMMISSION RATE OF FLUORINE IN PLANTS AS A QUANTITATIVE BASIS FOR AN IMMISSION LIMITATION. *(Die Immissionsrate von Fluor in Pflanzen als Masstab fuer eine Immissionsbegrenzung). Text in German. VDI (Ver. Deut. Ingr.) Ber., no. 164:39-45, 1971. 16 refs.*

The accumulation of fluorine in organs of plants which grow above ground, such as leaves and needles, represents an important criterion for the evaluation of the effect of phytotoxic fluorine compounds on vegetation. The quantity of fluorine absorbed depends on the sensitiveness and absorption capacity of the plants, and on the fluorine concentration in the surrounding air. Fluorine concentrations of less than 0.5 micrograms/cu m air can already cause an accumulation in the course of one growth period of more than 50 mg fluorine in 100 g dry leaf substance. With increasing concentrations of hydrofluoric acid in the air, enrichment of fluorine occurs in tomato leaves, grasses, clover, and other fodder plants. Based on the close connection between fluorine concentrations in the fodder and the fluoric intoxication of cattle, standards of fodder quality are suggested for the protection of domestic animals, particularly cattle and sheep. Since the fluorine content fluctuates with the seasons, a maximum yearly average of 4.0 mg fluorine in 100 g dry substance (DS) based on one analysis per month is proposed, maximum 6.0 mg F/100g DS within two consecutive months, and maximum 8.0 mg f/100 G DS in any individual month. Standardized grass cultures, grown in portable containers under controlled conditions of seed and soil have been developed as measuring devices for fluorine air polluon. They are being exposed to the open air for 14 days, then washed, dried, and pulverized to obtain the required condition for analysis of the fluor content.

13243 APTIC NO. 30424

Smith, William H.

LEAD CONTAMINATION OF ROADSIDE WHITE PINE. *Forest Sci., 17(2): 195-198, 1971. 23 refs.*

Lead contamination of eastern white pine was determined at various distances from an east-west section of Interstate 95 in southern Connecticut, which has a traffic density of 24,000 vehicles daily. Samples were collected on March 16, 1970, from a zone 1.2 to 1.8 m above the ground. Each consisted of twigs plus needles encompassing the entire growth (of the sampled branch) in the previous year. One sample was taken from the branch closest to the highway and another on the opposite side. The distance from the base of the tree to the closest paved surface of the highway was measured. Samples were prepared for lead analysis by drying at 80 C, grinding, and ashing at 500 C; lead content was determined by atomic absorption spectrophotometry. Lead contamination decreased regularly with increasing distance from the highway edge, was consistently higher on trees south of the roadway than on those to the north, and was generally greater on branches samples from the side of the tree closest to the highway as contrasted with branches analyzed farthest from the road on individual test trees. Samples up to 15 m distance from the highway often were contaminated with more than 100 ppm lead, much of which was presumably impacted on exterior surfaces. (Author abstract modified)

13244 APTIC NO. 30469

Spaeth and Meyer

OBSERVATIONS OF THE EFFECT OF COAL GAS ON THE VEGETATION OF TREES. *(Beobachtungen uber den Einfluss des Leuchtgases auf die Vegetation von Baumen). Landwirt., Ver. Sta., 1872(16):336-341. Translated from German. Belov and Associates, Denver, Colo., 8p., May 12, 1970.*

Investigations on the effects of coal gas on the growth of trees are discussed. The trees were distributed over an area of 28.28 sq m; 1.545 and 0.772 cu m of coal gas were introduced to the soil daily. After four weeks of gas treatment, the buds of trees which were certain to die had a seemingly healthy appearance. However, a closer examination of the cross sections showed the buds of the plane trees, silver poplar, American walnut, tree of heaven, and acacia were completely dead. The buds of the maple trees and the horse chestnuts were still alive but had a brown discoloration on the inside. Only the buds of the linden trees still seemed normal. However, they did not sprout in the spring. A closer examination revealed that all roots, with the exception of a few strong main roots, were dead. A large quantity of coal gas, introduced to the roots while in a state of hibernation was much less harmful than a much smaller amount introduced during their growing period. Some species (tree of heaven, locust, elm, and acacia) showed signs of poisoning sooner, some (maple and linden) later.

13245 APTIC NO. 30299

Spierings, F. H. and H. G. Wolting

INFLUENCE OF VERY LOW HF CONCENTRATIONS OF THE LENGTH OF THE DAMAGED BLADE-TIP REGION AND ON THE BULB YIELD WITH THE TULIP VARIETY PARIS . *(Der Einfluss sehr niedriger HF-Konzentrationen auf die Laenge der Blattspitzen-Schaedigung und den Zwiebelertrag bei der Tulpenvarietaet Paris). Text in German. VDI (Ver. Deut. Ingr.) Ber., no. 164:19-21, 1971.*

In a gardening area outside of Amsterdam, damage to tulips and gladioli by hydrofluoric acid emission from an industrial plant located 8 km away was noted. The same symptoms occurred inside of hothouses where tulips were grown already early in the year. Since HF concentrations inside of hothouses are normally considerably less than in the outside air, long-term tests were made with the tulip variety Paris which was known to be very sensitive. Inside a larger glass building, four specially designed exposure chambers, each of 30 cu m inside volume, were used for these experiments. For producing the noxious mixture of air and HF, air saturated with water vapor was forced through heated hydrofluoric acid, and then combined with a stream of purified outside air. Purification of the latter was effected by filtering for dust removal and passing through shell lime for absorption of gaseous impurities. The mixture thus obtained was equalized in a suspended nylon bag, and then admitted to the four chambers, where a change of atmosphere was taking place three times a minute. The outer air was either sucked in continuously, or alternatively a condition was established where nine tenths of the air was being circulated and one tenth drawn in. The HF concentration in the chambers was checked by sample taking in two three-hour periods each day, using an impinger for subsequent analysis. Graphs of damage to the plants were plotted for conditions of 0.5, 0.7, 1.4, and 4.3 micrograms HF/cu m, with number of weeks of exposure on the abscissa, and damage to blade points in cm on the ordinate. The increase of damage as a function of time was very small at 0.5 micrograms, but became very pronounced at the higher HF concentrations. A study on changes in the yield of bulbs in dependence of HF concentration revealed 100% yield up to 0.3 micrograms HF/cu m, falling off gradually to 55% at 4.0 micrograms HF/cu m air.

13246 APTIC NO. 30805

Suketa, Y., A. Endo, and T. Yamamoto

EFFECT TO AGRICULTURAL CROPS BY AMBIENT FLUORIDES. *(Kichu fukkabutsu no kankyo nodo to nosakubtusu e no eikyo). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):159, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, Tokyo, Japan, 1970.)*

The relationship between the fluoride concentration in the atmosphere and the distance from the source was examined. The atmosphere at polluted area A, 0.5 km from the emission source, contained an average of 10 F (counting the F of unpolluted area as one). The F in dust particles varied from 0.49 to 3.25 micrograms/cu m, and showed the highest concentration at the distance of 1.0 km from the emission souce. One-year old orange leaves at area A showed 227.0 ppm F content, and two-year old leaves had 571.3 ppm F. One-year old leaves had 165.7 to 203.3 ppm F at the distance 1.0 to 3.5 km from the emission source, and two-year old leaves had 365.3 to 391.0 ppm. The F in the air captured by alkali filter paper decreased in proportion to the distance, but the ratio did not coincide with that of F content in leaves and the distance, which seemed to signify an effect of F on metabolism. The F content and visual damage on taro potatoes was compared in area B in 1969 and 1970. Leaves with visible damage 0.5 km from the emission source contained 74.4 ppm and 69.4 ppm F, and those with no visible effect had 40.9 ppm. This contrasted with the F content in the plants in the control areas (distances of 10 km or more) which varied from 9.4 to 18.9 ppm.

13247 APTIC NO. 30806

Takahashi, R. , Y. Suketa, and T. Yamamoto

EFFECT OF ATMOSPHERIC FLUORIDE ON PLANT METABOLISM. *(Kichu fukkabutsu ni yoru shokubutsu taisha e no eikyo). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):160, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, Tokyo, Japan, 1970.)*

The influence of fluoride on glycolysis phosphoric acid enzyme of gladiolus, especially on beta glycero-phosphatase action was observed. Bulbs of glaioli were cultured for three weeks in Hoagland culture solution. They were then exposed to HF of a given concentration and temperature in fumigation chambers for one, five, and 10 days. Changes in beta glycerophosphatase action, protein content, chlorophyll content, and appearance of the leaves were observed. The glycero-phosphatase actions in the gladiolus leaves exposed in HF 11.7 micrograms/cu m and 20.9 micrograms/cu m were both lower than those of the control plants. The leaves affected by 20.9 micrograms HF functioned at 55% of the normal activity. Tests also revealed that gladiolus was much more susceptible to HF damage than crocus or iris. The protein content of the leaves and bulbs of gladiolus exposed to 20.9 micrograms/cu m HF showed a 42.5% decrease. Chlorophyll content in the leaves at 11.7 micrograms/cu m was 88% of that in the control plants. It decreased further to 69% in 20.9 micrograms. A significant effect of atmospheric f on plant metabolism was deduced.

13248 APTIC NO. 30812

Tamaki, T., M. Uehara, and Y. Umeda

THE EFFECTS OF THE SEA WIND ON THE PH VALUES OF THE PLANT CELL SAP. *(Shokubutsu yoju pH ni taisuru umikaze no eikyo). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):161, 1970. (Proceddings of the Japan Society of Air Pollution, Annual Meeting, 11th, Tokyo, Japan, 1970.)*

The effect of the wintertime sea wind on plants was tested on Jan. 20, Feb. 17, and March 18 on leaves of various plants including oranges at six locations along the eastern coast of Kagawa Prefecture. Hydrogen ion concentration of plant cell sap was measured by a portable pH meter with a special composite electrode; specific electric conductivity was measured by the flowing of leaf cell sap. The weather was observed at 23 locations by the Mori-type anemoscope-anemometer installed 100 cm high, at 500 m intervals. During the test period, the wind was predominantly western and the velocity was in general greater than in summer, but the peninsula coast showed a lower velocity. The pH value taken from the orange leaves showed a definite rise in January and March compared to February. However, the irregularity of the relationship between the pH value and the specific electric conductivity might prove the influence of air pollutants other than sea wind.

13249 APTIC NO. 30803

Tanaka, H., T. Takanashi, and M. Yatazawa

EXPERIMENTAL STUDIES ON SO2 INJURIES IN HIGHER PLANTS (PART 4). *(Aryusan gasu ni yoru shokubutsu higai no jikkenteki kenkyu (daiyonpo). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):152, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, Tokyo, Japan, 1970.)*

The effect of sulfur dioxide on amiacid metabolism was examined. Wheat seedlings one month old (20 cm) were exposed to 0.5 ppm SO2 at 22 C, and 40% humidity for four days, only during the day. A Beckman 120B amiacid analyzer revealed only slight effects, but it was conjectured that the plant had some separate amino acid in its body prior to the test, and that tht effect of SO2 was relatively low. A similar wheat seedling was placed in a closed glass container and was exposed to 300 ppm carbon dioxide (14) and 100 ppm SO2 for 30 min under 4000 lux. The first paper chromatography of 80% ethanol solubles from the leaves revealed that the Ala. value had increased but sir. had decreased in half. The second paper chromatography revealed that in both test and control plants, four kinds of material in amino acid had taken in C(14), and two of the four were Ser. Ala. The total C(14) taken in by the test material under SO2 exposure showed a noted decrease. The experiment proved that exposure of a plant to a high concentration of SO2 produced hydroxysulfonate in metabolism and impaired its glycol acid function.

13250 APTIC NO. 30286

Taniyama, Tetsuo and Hiroki Arikado

STUDIES ON THE MECHANISM OF INJURIOUS EFFECTS OF TOXIC GASES ON CROP PLANTS. VII. EFFECTS OF SULFUR DIOXIDE ON RESPIRATION OF RAPE PLANTS. *(Sakumotsu no gasu shogai ni kansuru kenkyu. Dai 7 ho. Natane no kokyusayo ni oyobusu SO2 in eikyo). Text in Japanese. Nippon Sakumotsu Gakkai Kiji (Proc. Crop Sci. Soc. Japan), 39(2):221-225, June 1970. 6 refs.*

The relation between sulfur dioxide gas and the respiratory rate of rape plants was investigated. Rape plant at the flowering stage were subjected to 0, 5, 10, 15 and 20 ppm of SO2 at temperatures ov 10, 20 and 30 C; the respiratory rate was continuously measured for eight hours. The duration of exposure was 30 minutes before measurement. The carbon dioxide respiratory rate of a rape plant controlled at 30 C was 2-2.3 mg/hr/100 sq cm of leaf area. When the plants were treated, the rates increased with the increase of gas concentration; eight hours after exposure to 20 ppm of SO2, it reached 4.5 mg. At 20 C, the rate of non-treated plants was 1.25-1.75 mg and that of those exposed dropped for 4-5.5 hours and then recovered. In the case of exposure to 20 ppm, the rate continued to decrease for eight hours. The respiratory rate of plants exposed to SO2 at 10 C always showed lower values than that of the controls and reached its lowest value at 20 ppm. From the above measurements, it became clear that the respiratory rate of rape plants changed with different ambient temperatures. The values at 10, 20 and 30 C were 7.3, 11.7 and 19.3 mg/100 sq cm of leaf area respectively for eight hours. From these data, indices of temperature (Q10) for 10-20 C and 20-30 C were calculated. The former was 1.6 and the latter was 1.65. The Q10 became larger with the increase in SO2 gas concentration, and reached its highest value (3.79) at 20 ppm and 20-30 C.

13251 APTIC NO. 30709

Taniyama, Tetsuro and Hiroki Arikado

STUDIES ON THE MECHANISM OF TOXIC GAS INJURY TO CROP PLANTS. 1. THE RELATIONSHIP OF SULFUR DIOXIDE CONCENTRATION TO THE EXTENT OF LEAF INJURY IN SEVERAL CROPS. *(Sakumotsu no gasu shogai ni kansuru kenkyu. 1. Su-shu sakumotsu no aryusan gasu nodo to yomen hakai teido tono kankei). Nippon Sakumotsu Gakkai Kiji (Proc. Crop Sci. Soc. Japan), vol. 37:366-371, 1968, 10 refs. Translated from Japanese, 12p.*

Paddy rice, barley, tobacco, orchard grass, and alsike clover were treated for two hrs/day for seven days with sulfur dioxide concentrations of 1, 5, 10, 15, and 20 ppm. Treatment was carried out in an exposure chamber at 25,C, 20 klux light intensity, and under 76-90% humidity variation. The experiment did not demonstrate any correlation between percentage of leaf injury and increase SO2 concentration, nor established whether the percentage of leaf injury is related to temperature and light intensity. Injury rates at the vegetative stage decreased in the following order: alsike clover, orchard grass, barley, tobacco; in the flowering stage, the order was tobacco, barley, rice. Leaves which had just completed flowering were found to have a high gas interchangeability. Therefore, the process of SO2 injury centers around center active leaves and upward and downward leaves in accordance with the absorption process of SO2 in terms of the gas interchangeability of the leaves. With increases in SO2 concentrations or treatment time, injury progresses from the cell, depending on differences in osmotic pressure.

13252 APTIC NO. 30723

Thompson, C. Ray, Gerrit Kats, and Earl G. Hensel

EFFECTS OF AMBIENT LEVELS OF NO2 ON NAVAL ORANGES. *Preprint, California Univ., Riverside, Statewide Air Pollution Research Center, 16p., 1971. 9 refs.*

Naval orange trees, enclosed in plastic-covered greenhouses, were essentially unaffected by exposure for eight months to ambient and two times ambient concentrations of nitrogen dioxide. There was no visible evidence of injury. While a numerical increase in leaf drop from selected branches was observed with the higher level of NO2, it was statistically insignificant as were differences in total leaf drop from each tree, weight of leaves dropped, and fruit yield. These observations indicate that NO2 levels in the Los Angeles Basin are probably without effect on citrus. (Author summary modified)

13253 APTIC NO. 30225

Weiss, Siegfried

AIR POLLUTION AND THE QUALITY OF WINE. *(Luftverunreinigung und Weinqualitaet). Text in German. Muench. Med. Wochenschr. (Munich), 113(23):901, 1971.*

Emissions of sulfur dioxide and halogens such as hydrogen chloride, chlorine, fluorine, and hydrogen fluoride stemming from factories and ref[illegible] burning produce damage or retarded maturation in grape vines. The maturing fruit is injured by intake of the pollutants through assimilation and through the fine wax layer that coats the berries. The taste of the berries may be spoiled by smoke, mineral oil vapors, asphalt, and tar. Following use of freshly tarred wooden supports for the vine, the taste of tar was transferred through the roots. Dust and soot deposits on the plants also slow the ripening process and impair the taste. Vines within 300 m of highways are polluted by lead. Fortunately, vineyards in Germany are rarely located near highways.

EFFECTS-MATERIALS

13254 APTIC NO. 30592

Donovan, P. D. and J. Stringer

CORROSION OF METALS AND THEIR PROTECTION IN ATMOSPHERES CONTAINING ORGANIC ACID VAPOURS. *Brit. Corros. J., vol. 6:132- 138, May 1971. 47 refs.*

Vapor corrosion is the acceleration of atmospheric corrosion of metals by trace amounts of volatile contaminants; typically these are volatile corrosive organic acids, especially formic and acetic acids. The main source of organic vapors is wood. The results of tests conducted on a variety of metals are presented in tabular form. Acetic acid vapors are more corrosive than formic acid vapors. This effect is particularly pronounced with magnesium, lead, zinc, and cadmium. Tin and nickel are slightly attacked at the highest concentrations of acetic acid, but this tends to be concentrated at discrete sites. Commercial low carbon sheet steel corrodes at a rate similar to iron; copper/ zinc brasses corrode at a rate similar to copper. The corrosion of cadmium by propionic and butyric acids explains its susceptibility to corrosion by vapors from freshly applied drying oil paints. The corrosion of zinc by formaldehyde suggests that zinc presents a suitable catalytic surface for the oxidation of formaldehyde to formic acid. Tests were conducted on some anodic metal steel coatings. Zinc/nickel, manganese/selenium, and cadmium/tin showed a moderate resistance to corrosion by organic acid vapors. The danger of hydrogen embrittlement arising from vapor corrosion attack are also discussed.

13255 APTIC NO. 30815

Fujii, Toru and Atsuko Hirata

STUDIES ON THE EFFECTS OF AIR POLLUTION ON THE FADING OF DYED FABRICS. *(Senshokubutsu no taishoku ni oyobosu taiki osen no eikyo ni kansuru kenkyu (1)). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):164, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, Tokyo, Japan, 1970.)*

Viscose rayon, acetate, tetron, and wool fabrics dyed in blue were arranged in covered and well-ventilated special wooden boxes and left on rooftops at three points with various sulfur dioxide concentrations in Osaka city. They were exposed to the air for the period of 63 days, each, first from mid-July and then from the end of September. The colors of the tested fabrics were measured by spectrophotometers. The fabrics were thoroughly vacuumed before applying the meter. The color differences at the end of the first period of exposure were found uniformally greater than that from the second period. Acetate, viscose rayon, and cotton showed a greater degree of fading; tetron, nylon, and wool showed generally a smaller degree of color change. The direct type dyes faded more than acid dyes. The greater the concentration of SO2, the smaller the degree of fading. But fading increased with the greater concentration of suspended dusts in the air. Thus, the fading of dyed fabrics was caused more by the concentration of suspended particulates than by SO2.

13256 APTIC NO. 30416

Jellinek, H. H. G. and P. Hrdlovic

CHAIN SCISSION OF BUTYL RUBBER BY NITROGEN DIOXIDE. II. PHOTO-OXIDATION AS FUNCTION OF NITROGEN DIOXIDE, OXYGEN PRESSURE, AND TEMPERATURE. *J. Polymer Sci., 9(5):1219-1233, May 1971. 7 refs.*

Studies of chain scission of butyl rubber (1.75% by weight of isoprene) have been extended. Experiments showing chain scission as a function of various oxygen and nitrogen pressures, temperatures, and near-ultraviolet light intensity are presented. The experimental data agree with the mechanisms assumed in previous work or with elaborations of such mechanisms to include additional factors, i.e., ultraviolet radiation. Nitrogen dioxide retards chain scission in the presence of near-ultraviolet light. Photooxidation in the presence of relatively high and low nitrogen dioxide pressures, respectively, show experimental curves of opposite curvature; these data have also been evaluated in terms of mechanism. Arrhenius equations are presented for experiments related to the different reaction mechanisms. (Author summary)

13257 APTIC NO. 30246

Kaplan, M. L. and P. G. Kelleher

OXIDATION OF A POLYMER SURFACE WITH GAS-PHASE SINGLET (1 DELTA G) OXYGEN. *Science, vol. 169:1206-1207, Sept. 18, 1970. 20 refs. (Presented at the Society for Applied Spectroscopy, Oct. 5-10, 1970.)*

Singlet molecular oxygen produced by the microwave discharge of ground state oxygen in a flow system was passed over a film of cis-polybutadiene. This treatment resulted in the formation, at the surface, of hydroperoxides which were detected by internal reflection infrared spectroscopy. The presence of hydroperoxides was also deduced from the liberation of iodine by the reaction between cis-polybutadiene treated with singlet oxygen and a saturated solution of potassium iodide in acetone. The yellow iodine color was monitored spectroscopically. Subsequent heating of the oxidized films at 125 C for 30 minutes in air resulted in the formation of carbonyl compounds, as would be expected upon thermal decomposition of hydroperoxides. Surface effects were much greater. Films that were unoxidized and subsequently heated show essentially no spectral changes either on the surface or internally. This behavior strongly suggests that the initial surface oxidation (with singlet oxygen) of polymer films, and probably of other substances as well, tends to overcome the well-known induction period observed in thermal autoxidations. (Author abstract modified)

13258 APTIC NO. 30217

Kautz, K. and H. Kirsch

NEW RESULTS OF CORROSION STUDIES IN THE FIELD OF REFUSE COMBUSTION. *(Neue Ergebnisse der Korrosionsforschung auf dem Gebiet der Muellverbrennung). Text in German. Mitt. Ver. Grosskesselbesitzer., 51(3):223-228, June 1971. 8 refs. (Presented at the VGB - Fachtagung Muellverbrennung 1970, Salzburg, Austria, Aug. 28, 1970, Hamburg, West Germany, Sept. 11, 1970, and Koln, West Germany, Sept. 25, 1970.)*

Slag, fly ash, dust, and waste gases are the causes of corrosion in incinerators. Waste gases contain, on the average, 25.4 ppm sulfur trioxide/cu m, 204.3 ppm sulfur dioxide/cu m, 214.2 ppm hydrochloric acid/cu m, 68,000 ppm carbon dioxide, 126,000 ppm oxygen, and 128,000 ppm water. The chloride content in the fly ash of flue gases is more than 50% at temperatures of less than 300 C, but only 10% at a temperature of more than 400 C. This means that at higher flue gas temperatures, chlorine is present almost exclusively in the form of gaseous hydrogen chloride. After a review of studies conducted on the corrosion mechanism in incinerators, the results of new radiographic studies are discussed. Ferric oxide, which protects the pipe, is converted to ferrous chloride in the absence of oxygen. This reaction takes place from 200 C upward. Potassium and sodium sulfate form chlorides from 350 C upward. This process does not occur in the presence of oxygen. Corrosion takes place at continuous reducing conditions and at the sudden change to an oxidizing atmosphere. At such a change, chlorine, which is particularly corrosive, is liberated. For the absorption of HCl by coatings, the absence or presence of oxygen is decisive. If oxygen is present in sufficient quantities, HCl is not absorbed and no corrosive reaction occurs. The presence of carbon monoxide seems to have no great importance.

13259 APTIC NO. 30406

Rasch, R.

SULPHIDE CORROSION ON HEAT-EXCHANGER SURFACES IN FIRE BOXES. *(Beitrag zur Sulfidkorrosion auf Waermetauscherflaechen in Feuerraeumen). Text in German. Aufbereitungs-Technik, 12(5):247-254, 1971. 45 refs.*

With the aid of thermodynamic calculations, some reaction mechanisms concerning high-temperature corrosion in refuse incinerators, boiler furnaces, and smelting furnaces were found which agree with the results of laboratory experiments and practical experience. Direct formation of alkali sulfides from hydrogen sulfide in flue gases with alkali compounds is unlikely. The alkali sulfides are formed via the Foerster-Kubel reaction. Direct formation of iron sulfide from hydrogen sulfide during the reduction stages of iron oxide is always possible. A dependence on the water vapor and the hydrogen partial pressure of the flue gases is discernible. For this reason, iron sulfide formation is more intense in hard coal-fired furnaces than in incinerators and oil-fired furnaces. Only with combustion of hard coal/water dispersions can the sulfide formation be expected to subside. A reaction takes place between alkali sulfide and iron oxide which leads to iron sufide formation. Silicon sulfide does not lead to iron sulfide. Nickel as an alloy component has the same properties as iron, while chromium oxide in the protective coating is not reduced at temperatures existing on heat exchanger surfaces.

13260 APTIC NO. 30382

Satake, Jiro and Takashi Nakajima

ON EFFECTS OF STRUCTURE AND SHAPE ON CORROSION OF IRON AND STEEL- ON FACTORS AFFECTING ATMOSPHERIC CORROSION OF IRON AND STEEL, VII. *(Tekko no taiki fushoku ni okeru kozokeijo no eikyo no tsuite - Tekko no taiki fushoku ni oyobosu kakushu yoin ni tsuite, VII). Text in Japanese. Tetsu to Hagane, 57(4):132, March 1971.*

Various tests were conducted to verify the assumption that corrosion of the same iron or steel may vary with its structure and shape even under the same environmental conditions. Atmospheric exposure tests of the sample materials were conducted in various ways-changing direction, inclination, and surface finishing of the samples to determine their relationships to the atmospheric corrosion. The samples included one with a projection along the center line, to see the effects of shaping and processing, another with a welded part, and still another combined with a different kind of metal such as stainless steel, brass, high-tension steel, and aluminum. The samples were ordinary steel and weather-proof steel. The relationship between the degree of the inclination and the corrosion was shown in graphic form, revealing that the corrosion of the front side of the sample was practically unaffected by the inclination but that of the reverse side was greatly affected, the most affected being a horizontal surface. The corrosion was generally greater on the front side than on the reverse. This trend coincides with their drying speed after wetting. It is attributable to the fact that the rust formed on the front side is washed off by rain, and that the front side dries faster, so the stabilization of the rust progresses faster. No particular common trend in the external and average corrosion, which was caused by contact with another kind of metal, was noted. But the deeper corrosion was locally noted at the part where the sample was in contact with stainless steel or brass. Shaping and processing affected the corrosion to some extent, showing the deeper corrosion at or about the bend. These phenomena may be attributed to differences in moistening by rainfall and drying speed.

13261 APTIC NO. 30675

Taylor, M. F., P. J. Boden, and E. Holmes

INFLUENCE OF SOME BINARY ALLOY ADDITIONS ON THE ATMOSPHERIC CORROSION OF HIGH-PURITY IRON. *Brit. Corros. J., 6(2): 61-65, March 1971. 15 refs.*

The atmospheric corrosion behavior of pure iron and iron-manganese, iron-chromium, iron-copper, and iron-nickel alloys was investigated in short-term exposure tests and accelerated laboratory tests in humid atmospheres. The role of each alloy was thus assessed without the interference of carbon and other impurities found in mild steel. Neither a higher corrosion rate nor a higher sulfate content was found in winter, although atmospheric sulfur dioxide averaged 124 mg/cu m/day in winter against 88 mg/cu m/day in summer. Copper additions reduced the rate of corrosion, but not as effectively as large amounts (10%) of chromium. Oxidation of specimens before corrosion did not change the overall amount of corrosion, but completely altered the nature of the attack. More nucleation sites were provided and rust covered the entire surface in an adherent layer. The accelerated tests established that the protective nature of an alloying element in a corroding atmosphere manifests itself only when a film of rust covers the whole surface. (Author abstract modified)

13262 APTIC NO. 30287

Yoshida, Hideo, Shoji Iwakuni, Shigenori Miyazaki, and Yoshiharu Omori

TEST RESULTS OBTAINED IN LINING OF ARC FURNACE DUST COLLECTING INLET, CONSTRUCTED BY MODIFIED METHOD USING BRICK OF IMPROVED QUALITY FOR INCREASING DURABILITY OF LINING. *(Denkiro ro robuta shujinko renga ho shiyo keika). Text in Japanese. Taikabutsu (Refractories), 22(151):356-357, Aug. 1970.*

Under severe furnace operating conditions, the durability of the covers for two arc furnaces notably decreased. Although the furnaces have been in operation only since 1966 and 1968, respectively, the covers had to be replaced frequently. The primary cause was the unburned high alumina bricks lining the dust collecting inlet provided in the cover; some of the bricks began splintering in April 1969. The problem was solved by changing the quality and shape of the bricks. Three methods of renovation were tried: the magchro direct bonded brick shaped as before; SiC-added high alumina brick shaped as before; and the magchro direct bonded brick of sleeve winding shape. Characteristics of the conventional unburned high alumina brick and the magchro direct bonded brick included, respectively; 2.57 and 3.05 for bulk specific gravity; 22.0 and 16 for apparent porosity; 401 and 600 or higher for compression strength; and T2 0.53 at 1000 C and 2.05 at 1500 C for coefficient of hot linear expansion; unmeasured and 70 for higher for hot bending strength (kg/sq km), 22 and 2.0-2.5 for SiO_2, 74 and 4.0-5.0 for Al_2O_3, 1.44 and 4.0-5.0 for Fe_2O_3; 0.16 and 0.15-1.0 for CaO; 0.26 and 78.0-82.0 for MgO, and unmeasured and 7.0-9.0 for Cr_2O_3. Because of difficulties in obtaining materials for methods 1 and 2, the third method was concluded to be the most practical.

EFFECTS-ECONOMIC

13263 APTIC NO. 30329

CONFERENCE ON THE PUBLIC ACTION AGAINST POLLUTION. *(Convegno sul tema L intervento pubblico control l inquinamento). Text in Italian. Riv. Combust., 24(10):453-454, Oct. 1970.*

A brief summary is given of a meeting held June 18-19, 1970 in Rome, sponsored by two corporations, on the responsibility of the public in pollution control. A 175-page report was presented to the public, and the meeting was thrown open to discussion. The thrust of the presentation indicated that the two corporations expect the public to shoulder most of the financial burden for pollution control, since it is the public which primarily benefits from the preservation of the environment. Estimates of the cost of eliminating the principle forms of air and water pollution in Italy called for an investment cost of 609 billion lire (about one billion dollars) in 1970, decreasing to 243.7 billion lire (389 million dollars) in 1980. The operating and maintenance costs are 47.6 billion lire (76 million dollars) for 1970, increasing to a projected 714.3 billion lire ($1,143,000,000) or 888.8 billion lire ($1,422,000,000) by 1985, according to two differing estimates. One criticism of these figures is that they assume the immediate implementation of certain measures that the industries involved do not consider feasible at present. For instance, the plan calls for the use of catalytic afterburners and lead-free gasoline in the automotive and petroleum industries, both of which consider these improvements unattainable at the moment. The study assumes an investment for catalytic exhaust manifolds and the additional annual cost of lead-free gasoline. Investment costs are also given for the metallurgical industries, nonmetallurgical industries related to mining, chemical industries, thermoelectric plants, and domestic heating. The figures for domestic heating assume that the heating plants are already adequately equipped with pollution controls in accordance with the Italian anti-smog law (No. 615).

13264 APTIC NO. 30462

POLLUTION: THE COST TO INDUSTRY. *Mod. Mfg., 7p., 1970.*

It is possible to relate the cost of pollution control to the total cost of manufacturing the product. A survey showed that $1.6 billion will be spent by manufacturing industries for pollution control in 1970. Some primary metal manufacturing plants are spending as little as one percen of their manufacturing cost on pollution control while other plants in the same industry are spending 20%. As a result of an exclusive pollution survey, industry-by-industry data were presented. The figures enable a comparison of similar plants.

13265 APTIC NO. 30742

Crocker, Thomas D.

URBAN AIR POLLUTION DAMAGE FUNCTIONS: THEORY AND MEASUREMENT. (FINAL REPORT). *Wisconsin Univ., Madison, NAPCA Contract CPA-22-69-52, 124p., 1971 (?). 69 refs.*
NTIS: PB 197668

A damage function relating air pollution dosages to the market value of the production and the consumption opportunities suffered by receptors is discussed. Theoretical damage functions are developed considering the sufferer. Data from Chicago is used to develop the empirical functions. Information on monthly ambient air concentrations of suspended particulates, sulfur dioxide, and dust fall was combined with individual family residential property transactions. Then the FHA assessed value was compared to the actual market price, and air pollution distributions were compared for different stations. Also, various variables were noted. When results were compared for 1964, the dosages and the sales coincided. The correlation coefficients for the various variables were high. Statistically significant multicolinearity occurred. After various weaknesses in the statistics were checked, it was concluded that air pollution dosages had some impact on residential property values. Land or site values were more sensitive to air pollution dosages than property values. Statistically significant results were not obtained when monthly air pollution data was used; however, results having moderate degrees of statistical significance were occasionally encountered when the mean annual air pollution data was used. Property values and air pollution in St. Louis are discussed in two appendixes.

13266 APTIC NO. 30775

Crocker, Thomas D.

SOME ECONOMICS OF AIR POLLUTION CONTROL. *Natur. Resources J., vol. 8:236-258, April 1968. 17 refs.*

The problem faced by those responsible for the evolution and the application of air polluton control policy is to make the consequences of the collection of individual decisions about the present values of private recovery costs and benefits conform with what are thought to be socially desirable consequences. Those devices proposed for the control of air pollution which have received the greatest public attention are the emitter charge and the emitter standard. Application of the charge and standard is discussed.

13267 APTIC NO. 30751

Gillette, Donald G.

WHY ASSESSMENT OF DAMAGE. *Preprint, Pennsylvania State Univ., University Park, 13p., 1971. 4 refs. (Presented at the Agricultural Extension Workshop on Environmental Pollution as It Effects Crops, State College, Pa., May 25-27, 1971.)*

Justification for the allocation of funds to support and operate air pollution control programs should ultimately be based upon the benefits the general public receives. Resources are generally scarce and therefore should be employed in those activities which result in the greatest social return or benefit. Thus, in allocating these scarce resources the social benefits derived from air pollution control programs need to be compared to those of other programs. Unfortunately, decisions on program funding particularly in the environmental field are based on limited information. Better information on damage assessments or effects of air pollution is needed to improve the efficiency of resource allocation and provide direction to decision makers involved with environmental problems. (Author abstract)

13268 APTIC NO. 30758

Montgomery, W. David

OPTIMAL LICENSING FOR MULTI-FIRM POLLUTION SITUATION. *Preprint, Harvard Univ., Cambridge, Mass., Dept of Economics, 22p., March 1971. 7 refs.*

A cost benefit study shows that with fixed location of pollution sources, convex cost functions, and no externalities between firms, it is possible to use a market in licenses to achieve given air quality goals with the least cost. Moreoever, any distribution of the fixed totals of licenses among firms give rise to the same equilibrium. (Author conclusions modified)

13269 APTIC NO. 30760

Stickney, P. B., W. J. Mueller, and J. W. Spence

COSTS OF AIR POLLUTION DAMAGE AS THEY RELATE TO THE PRODUCTS OF THE RUBBER INDUSTRY. *Preprint, Battelle Memorial Inst., Columbus, Ohio and Environmental Protection Agency, Raleigh, N. C., 23p., May 1971. 6 refs.*

The yearly cost of air pollution as it affects products of the rubber industry was estimated. This included both the added costs at the manufacturing level, which ultimately pass to the consumer, and the costs which the consumer bears directly. The total estimated cost at the consumer level is at least $500 million yearly. Of this, $398 million can be accounted for in detailed estimates, and the remainder represents cost for which no detailed estimates could be made. Three areas of cost are recognized which could not be estimated with any degree of accuracy because of the lack of data. These are labor associated with the early replacement of rubber products, replacement of entire assemblies when a relatively inexpensive part fails, and losses associated with downtime or non-availability of equipment while being repaired because of the failure of a rubber part. These are probably rather sizable loss factors, but any estimate of their actual magnitude at this time would be guess work. (Author summary modified)

STANDARDS AND CRITERIA

13270 APTIC NO. 30160

Tokyo Metropolitan Government (Japan), Bureau of Sanitation

REFERENCE MATERIALS FOR INVESTIGATION ON LIFE ENVIRONMENT IN ADMINISTRATION FOR HEALTH ON PUBLIC INJURY.

(Kogaihoken gyosei ni okeru seikatsukankyochosa sanko shiryo). Text in Japanese. 47p., Oct. 1970. 14 refs.

Information is compiled on the following subjects: 1. Environmental standards adopted by Japan and other countries, including the U. S., for sulfur oxides, carbon monoxide, and water pollution. 2. Typical methods and equipment employed for measuring sulfur dioxide, carbon monoxide, hydrocarbons, and oxidants in air and water. 3. Official standards of smog and photochemical smoke, and countermeasures to be taken in emergency air-pollution episodes. 4. Points at which air quality is measured by the Bureau of Environmental Protection of the Tokyo Metropolitan Government. In addition, characteristics of main pollutants are described and the term public injury defined. Extracts are presented from laws and ordinances concerned with public injury.

13271 APTIC NO. 30164

MEASUREMENTS OF AIR AND WATER IMPURITIES ARE BEING STANDARDIZED.

(Matningar av luftoch vattenfororeningar standardiseras). Text in Swedish. Tek. Tidsk., 100(16):58, Oct. 1970.

The International Organization for Standardization has created two new committees concerned with air pollution and water pollution. Their purpose will be to create internationally applicable methods of pollution measurement and control, to form the basis of legislation in the various countries. It has been estimated that 4000 tons of sulfur dioxide descend on Sweden daily, much of it being derived from such European regions as the Ruhr in West Germany. There are also cases where water pollution crosses national boundaries, so that there is a need for the seventy member nations of the IOS to have technically feasible principles for international control of these problems. The existence of pollution regulations that vary from country to country has in some cases been a stumbling block to international commerce. Thus, standarization will also benefit this area of human endeavor. The decision to create the committees was made at the recent ISO meeting in Ankara, Turkey, at which representatives of 50 nations were present.

13272 APTIC NO. 30184

Chiba Prefecture (Japan)

SUPPLEMENTARY REPORT CONCERNING GOI AND ANEZAKI AREA.

(Goi, Anezaki chiku hokan chosa hokoku). Text in Japanese. 13p., Dec. 1970.

An investigation of industrial pollution was conducted in Chiba Prefecture. The Goi Anezaki Area Air Pollution Prevention Council was organized in April 1969, and with 1973 as the target year, industries were guided to take necessary measures for the prevention of air pollution which are technologically and economically possible. Wind channel experiments were conducted using a 1/2500 scale model of the area and repeated three times for the same chimney stack. Since the limitation of a mock-up model in the wind channel experiments did not allow experiments for less than 20 m high stacks and less than one m diameter at the top, a necessary adjustment had to be made by electronic computer. The Sutton-Bosanque formula was used to forecast the concentration on the ground by taking into consideration down-wash and down draft effects. In 1973, when the industrial belt will be completed, there will be 150 factories using more than five kl heavy oil, a rapid increase from 1968. The discharge of sulfur dioxide in 1973 will double the amount discharged in March 1969. According to the wind channel experiments and theoretical diffusion calculations, in 1973 there will be very high concentrations in the area near the River Yoro, and 0.2 ppm SO2 will be exceeded in a wide area. Standards for industry are an hourly maximum of 0.25 ppm with a SSW wind and 0.20 ppm SO2 otherwise. When the industrial concentration is expected to be 0.2 ppm, the on-site concentration should be less than 0.015 ppm. Chimney stack heights should be over 30 m. The sulfur content of heavy oil used by factories should not exceed a maximum of 1.7%. After 1974, industry will be urged to change to liquefied natural gas and have a complete desulfurization of smoke. The total discharge of SO2 should not exceed 19,000-20,000 N cu m/h after 1973. Autonomous bodies should continue checkups, a complete monitoring system should be developed, and full care must be taken in the reclamation and construction of new factories.

13273 APTIC NO. 30870

Basmadshijewa, K., M. Argirowa, and E. Dawidkowa

HYGIENIC ESTABLISHMENT OF THE VALUE OF THE MAXIMUM CONCENTRATION OF IMMISSION FOR METHYLENE CHLORIDE IN THE AIR OF THE ATMOSPHERE.

(Hygienische Begruendung des MIK-Wertes von Methylendichlorid in der atmosphaerischen Luft). Text in German. Wiss. Z. Humboldt Univ. Berlin Math. Naturw. Reihe, 19(5):469-470, 1970. 7 refs.

The short-time maximum permissible emission concentration value for methylene dichloride was sought by determining the olfactory sensitivity threshold, the reflex threshold of the eye by means of optical chronaxy, and the vascular reaction by means of finger plethysmography. The range of methylene dichloride concentrations used in the experiments involving 10 individuals was from 2.8 to 33.2 mg/cu m. The olfactory sensitivity threshold was found to be 4.1 mg/cu m for the most sensitive individuals. The visual reflex threshold was found to coincide with the olfactory sensitivity threshold, which was 2.8 mg/cu m. The reflex threshold determined by finger plethysmography was 6.5 mg/cu m, and the lower threshold was 4.1 mg/cu m. In view of these findings, a short-time maximum permissible emission concentration of three mg/cu m methylene dichloride in atmospheric air is proposed.

13274 APTIC NO. 30454

Heuss, Jon M., George J. Nebel, and Joseph M. Colucci

NATIONAL AIR QUALITY STANDARDS FOR AUTOMOTIVE POLLUTANTS: A CRITICAL REVIEW. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 24p., 1971. 52 refs. (Presented at the Air Pollution Control Association Annual Meeting, 64th, Atlantic City, N. J., June 27-July 2, 1971 and submitted for publication in the Journal of the Air Pollution Control Association, September 1971, with discussion by the U. S. Environmental Protection Agency.)*

A critical review of the studies which form the basis for the national air quality standards for carbon monoxide, nitrogen dioxide, hydrocarbons, and photochemical oxidants indicates that the standards are unduly restrictive. The CO standard is based on a blood carboxyhemoglobin level below that associated with any physical or mental impairment. It is suggested that CO air quality standards be established as 15 ppm for a 12-hour exposure and 50 ppm for a one-hour exposure. The NO2 standard is based on a questionable epidemiological study that needs further verification. Additional studies should be conducted, ideally, near a large stationary NO2 source. Until the findings of the original study can be validated by an independent study, the California NO2 Standard of 0.25 ppm for one hour is recommended. The hydrocarbon air quality standard is based solely on the probability of non-methane hydrocarbons reacting to produce oxidant. No hydrocarbon standard is necessary, since an oxidant standard has been established. The photochemical oxidant standard is based on a questionable extrapolation of the results of a single study. An analysis of the available information indicates that there are no significant effects of oxidants on human health at concentrations below 0.15 ppm. An oxidant standard of 0.10 ppm for one hour would adequately protect public health. (Presented at the 64th Annual Meeting of the Air Pollution Control Association, Atlantic City, N. J., June 23-July 2, 1971 and submitted for publication in the Journal of the Air Pollution Control Association, September 1971, with discussion by the U. S. Environmental Protection Agency)

13275 APTIC NO. 30780

Nakano, Michio

SIGNIFICANCE OF ENVIRONMENTAL STANDARDS. *(Kankyo kijun no igi). Text in Japanese. Nenryo Oyobi Nensyo (Fuel and Combustion), 38(6):521-535, June 1971.*

The history of establishing environmental standards is described, as well as the present status of criteria, standards, goals, and environmental standards for sulfur oxides. The sulfur dioxide concentration in the air was monitored in Osaka, Tokyo, and 30 other major cities. Out of 136 monitoring stations, 76 met the standards in 1967; in 1968, 107 of 172 monitoring stations, met the standards. The carbon monoxide in Osaka was monitored at two stations, from October 1967 to April 1970. The monthly average ranged from three to seven parts per million; the monthly maximum was 50 ppm, and the minimum, 12 ppm. The annual CO averages in Tokyo were: 8 ppm in 1965, 5 ppm in 1966, 8 ppm in 1967, 4.9 ppm in 1968, and 2.5-10.6 ppm in 1969. The monthly average in 1969 ranged from 1.5 to 13.4 ppm CO. The environmental standard for sulfur oxides were determined in 1969, and those for CO in 1970; the standards for particulates will be determined in the future. The environmental standards do not mean that these concentrations are absolutely safe; they should be interpreted as policy targets. Therefore, it should not be though that these levels can be safely reached in the still unpolluted areas. In Osaka 13,000 inhabitants were examined for symptoms of chronic bronchitis: 4 out of 100 had this disease when 0.05 ppm (hourly average for a year) was the standard for sulfur oxides. It is suggested that 0.05 ppm should be reduced to less than 0.03 ppm SO2.

13276 APTIC NO. 30833

Stern, Arthur C.

AIR POLLUTION STANDARDS. *In: Air Pollution. Arthur C. Stern (ed.), Vol. 3, 2nd ed., New York, Academic Press, 1968, Chapt. 51, p. 601-718. 22 refs.*

The preferred sequence of development of air quality standards is as follows. (1) Prepare air quality criteria, which are analyses of the relationship between pollutant concentrations in the air and the adverse effects associated therewith. (2) From the air quality criteria, develop air quality goals, which are the concentrations of pollutants with which we believe we can live without adverse effects on health and welfare. (3) From the air quality criteria, develop air quality standards, which are the concentrations of pollutants which we intend to achieve in the immediate future, but which fall short of our air quality goals because the standards must give consideration to feasibility of achievement within the immediately foreseeable future. (4) From the air quality goals, develop emission goals, which are the concentration of pollutants in emissions, which by computations based on present assumptions as to the number and nature of sources in the future, will be necessary to achieve air quality goals. (5) From the air quality standards, develop emission standards, which are the concentrations of pollutants in emissions which are necessary now to achieve air quality standards. (6) From the emission standards, develop design standards, which are the limits on choice of site, equipment, and fuel necessary to achieve emission standards. (7) In order to develop any of the above standards, there must also be standards for measurement and testing of the ambient air, effluent gas streams, control and analytical equipment, and air pollution effects. (Author introduction)

LEGAL AND ADMINISTRATIVE

13277 APTIC NO. 30140

THE GOOD EXAMPLE FROM SWEDEN - ENVIRONMENTAL PROTECTION RECEIVES GREAT ATTENTION. *(Gutes Beispiel aus Schweden - Umweltschutz wird gross geschrieben). Text in German. Wasser Luft Betrieb, 15(5):192-194, 1971.*

In 1969, the Swedish parliament passed new regulations concerning environmental pollution. The maximum concentration of sulfur in oil was lowered to 2.5% by weight, effective July 1, 1969. Beginning with winter 1971, in Stockholm, Goeteborg, and Malmoe, and ten other regions sulfur concentrations of only one percent by weight will be permitted in oil. The government appropriated about $40 million to aid the industry in fulfilling the more stringent air pollution regulations. Two offices have been created to supervise the execution of the new laws. Questions of environmental protection are being discussed in schools; experts have long been trained on the university level in this field. Radio and television discuss the problems, and journals are being published which address not only the experts but also the general public. An all-out drive is under way to educate the public and get everyone s cooperation and support in the fight against environmental pollution.

13278 APTIC NO. 30152

Tokyo Metropolitan Government (Japan)

PLAN TO DEFEND TOKYO CITIZENS FROM POLLUTIONS. *(Tomin o kogai kara boei suru keikaku). Text in Japanese. 306p., March 1971.*

Tokyo has four principles for environmental standards: they are not only conducive to health and safety, but also guarantee pleasant life for citizens; they are not merely policy targets, but also must be put into practice; a period for achievement is set, and necessary plans, steps, and the definite period are shown the citizens; and they are not mechanically set, but real characteristics will be taken into consideration. The 1964-65 level for air should be maintained, or a level between the first and second stage set by WHO. Basic measures are to eliminate and restrain the sources of pollutants, disperse and dilute pollutants into the atmosphere, and restrain and disperse the concentration of pollution sources. For sulfur dioxide (including a part of nitrogen oxides), high chimney stacks are not quite the answer, so instead fuels must be controlled by a switch to electricity or gas, regional air conditioning, and the utilization of heat wasted at generating stations and garbage incineration plants. For automobile exhaust gas, idling must be controlled, a device to eliminate exhaust gas must be installed, and congestion at intersections, must be eliminated. Also there must be adequate investment on highway construction, restriction of traffic, and allowable exhaust gas volume. Priority use of roads must be established, by road, areas, vehicle type and time period. Garages and parking must be controlled or prohibited. Alternate mass transport systems must be improved, and some roads must give priority to city buses. Although polycentric-type city structure is conducive to traffic dispersion, it may also aggravate the situation. Warehouses and other distribution functions in the center of town should be dispersed, as people move to suburban areas. An environmental standard for SO2 for Tokyo will be achieved by 1973, drastically cutting down SO2 discharge (by 56%). For particulates, the target is a 40% cut of the present level by 1973 from the installation of more dust collectors and the switch to other fuels than oil. Carbon monoxide will be cut, by stringent control of idling. The total of exhausted hydrocarbons and lead from automobiles will be cut to the 1965 level of 47 tons/day by 1973. Periodic checks on gasolines will be made for tetraethyl lead. Also, efforts will be continued after 1973 to cut down these pollutants further.

13279 APTIC NO. 30451

Senate, Washington, D. C.

AIR QUALITY ACT OF 1967. *P. L. 90-148, 23p., Nov. 21, 1967.*

The full text is given of the Air Quality Act of 1967. The Act amends the Clean Air Act by authorizing planning grants to air pollution control agencies, expanding research programs relating to fuels and vehicles, providing for interstate air pollution control agencies or commissions, and authorizing the establishment of air quality standards.

13280 APTIC NO. 30456

Ecological Society of America, Study Committee and Peat, Marwick, Mitchell and Co.

NATIONAL INSTITUTE OF ECOLOGY: AN OPERATIONAL PLAN. *NSF Grant GB 6890-002, 42p., Dec. 1970.*

NTIS: PB 196900

An organizational plan for a proposed National Institute of Ecology is presented. The Institute would have five essential functions: basic ecological research on global biospheric processes, large scale ecosystems, and ecological models; definition of the problems and on-site investigation; environmental and resource management policy; information resources, analytical and modeling services, taxonomic support, and field facilities and installations; communication and education. The Director of the Institute would be appointed by and responsible to a nine-man Board of Trustees who would be chosen by the Founding Institutions and a more open Assembly. The professional staff would include 40 or more full-time persons in the first year, increasing to about 150. Also, the annual budget would rise from $3.4 to $12.5 million in three years (exclusive of construction costs).

13281 APTIC NO. 30649

Shizuoka Prefectural Government (Japan)

STUDY ON THE LIVING ENVIRONMENT. *(Seikatsu kankyo no kenkyu). Text in Japanese. 130p., May 1968.*

An examination has been started to establish a favorable environment in Shizuoka Prefecture in view of its anticipated urbanization. In the first year, nine research meetings were held, emphasizing the examination of study methods and the collection of reference material. Several topics were discussed, including: theory of the living environment and methodology of planning; the pattern of the people s desire towards the living environment; the attitude towards environmental planning; what is a healthy living environment; leisure and environment; ways of preventing the environment from corruption; and administrative measures for the living environment. Five themes are necessary for pursuing the study: basic study of the living environment, related areas, study of planning areas, planning of the living environment plan, and study for the operation of the plan. Each of these approached from the standpoint of ideas, research, theory, and practice. For each stage, 73 items with objects are selected and the approaches for pursuing these objects are shown from each special area. A summary of nine research meetings, reports, and a catalog of reference materials about the living environment for Shizuoka Prefecture are included.

13282 APTIC NO. 30688

WHAT KIND OF ADMINISTRATION SHOULD BE PRACTICED FOR POLLUTION CONTROL AT PREFECTURE LEVEL? (Todofuken ni okeru kogai gyosei no arikata (Dai 1 po)). Text in Japanese. 224p., 1970.

The conditions of administration in pollution control, especially the activites of health centers were studied. All the prefectures and 25 special cities in Japan were objects of the study. The areas investigated include: kinds of pollution, regulations for pollution control, administrative procedures, organizations of departments or sections in charge, related research organizations, cases of pollution problems which were disposed of based on relevant laws or regulations, and non-governmental activities. In the research organizations, the activity and career of personnel in full-time duty were examined. In health centers complaints about pollution, disposition of the problem, and demands for activity were studied. Air pollution, water pollution, noise, vibration and offensive odors were reported by all the prefectures and cities. Though ground shrinkage was reported by 21 prefectures and nine special cities, industrial wastes were treated as pollutants only by three prefectures and six cities. There were nine prefectural institutes, or centers, on pollution research. However, in almost all the prefectures and cities, studies were done by the institutes of public health. Personnel in medicine are desirable for fulltime service, as well as scientists and engineers. At the health centers near cities, only one person for five health centers was in charge of pollution problems, regardless of many complaints. In spite of the increase in pollution problems with the development of industrialization, administrative activity concerning pollution was underdeveloped at health centers in agricultural and fishing villages. The number of intermediate-type health centers belonged between the above mentioned two types, and was only one-tenth of the total number of health centers in Japan. Their activities and instruments for measuring pollutants are efficient. Residents are highly concerned about pollution problems, and since the number of complaints will increase in the future, accomplishment of activities at health centers is urgently needed.

13283 APTIC NO. 30700

Environmental Protection Agency, Research Triangle Park, N. C., Air Pollution Control Office

SUMMARY OF AIR QUALITY CONTROL REGIONS. (INTERIM REPORT). *202p., April 1971.*

Maps and data describing the 57 air quality control regions presently designated through the 50 States, District of Columbia, Guam, American Samoa, Puerto Rico, and the Virgin Island were presented. Names for the regions were chosen to correspond to a local name, geographic area, major city in the region, or a State-requested name. A summary of air quality control regions according to type (interstate, intrastate, or remaining area) and number of air quality control regions in each State or territory were given. Maps of all areas covered by air quality control regions show boundaries of the air quality control regions. After each map, a list of the air quality control regions and the jurisdiction included within them were given.

13284 APTIC NO. 30779

REVISED REGULATION FOR ENVIRONMENTAL CONTROL, TOKYO. *(Tokyoto kogai boshi jorei no shiko kisoku okaisei). Text in Japanese. Netsu Kanri (Heat Management: Energy and Pollution Control), 23(3):61-63, March 1971.*

A revised regulation initiated in Tokyo standardized the sulfur content in oil used by factories according to their total oil consumption. The installation of smoke and dust collectors for boilers, furnaces, incinerators, and of an anti-steam device against hydrocarbon gas was ordered. Factories were requested to reduce their discharge of sulfur dioxide by 30% to 70% at the time of smog warnings. The owners of automobiles were advised to install afterburners at authorized garages. Copper, zinc, oil, COD (chemical oxygen demand), appearance, odor, and temperature were added to the previous list of 11 water pollutants subjected to the maximum discharge law. Factories along the Tama, Edo, and Naka Rivers will receive a warning as soon as the water content reaches a certain point. Vibration and dust were newly designated as subject to noise control0 laws. Seventeen items were newly designated as industrial wastes, including alkali and acid wastes, metal dust, and sludge. Factories were requested to report periodically concerning the classification, quantity, and method of disposal of various wastes, and to appoint qualified pollution controllers for each category of environmental pollution.

13285 APTIC NO. 30828

United States 92nd Congress

THE CLEAN AIR ACT. *56p., Dec. 1970.*

The Clean Air Act is divided into two sections: air pollution prevention and control and emission standards for moving sources. Special emphasis is given to research relating to fuels and vehicles. The Act also provides for grants for the support of air pollution planning and control programs. Air quality control regions, air quality criteria, and national ambient air quality standards are set up. Implementation plans are provided. Standards for the performance of new stationary sources and national emission standards for hazardous pollutants were outlined. A President s Air Quality Advisory Board and advisory committees were established. Motor vehicle emissions and fuel standards and aircraft emission are also regulated.

13286 APTIC NO. 30875

NATURAL RESOURCES PROTECTION STUDY: INTRODUCTION AND ATMOSPHERE - AIR POLLUTION. *Enviromedia, Inc., St. Paul, Minn. and Steinitz Rogers Assoc., Inc., Cambridge, Mass., p. 1-7 and p. 78-81, Nov. 1970. NTIS: PB 196142*

Airport development areas at Ham Lake and Rosemount, Minnesota were evaluated with regard to 20 natural resource systems, the potential impact of eight land use intensity types on the systems, and the actions required to minimize these environmental impacts. One of the resources examined was air. As with the other systems, computer analyses resulted in the establishment of resource zones of varying degrees of vulnerability or sensitivity. These zones are defined and the impact of the various categories of land [illegible] on air quality in each zone noted. Actions that should be taken to minimize air pollution in each area include the application of air quality standards, adequate enforcement of present air-pollution control regulations, effective monitoring, and meaningful penalties for violations.

13287 APTIC NO. 30756

Berger, Charles Matthew

AIR POLLUTION AS A PRIVATE NUISANCE. *Wash. Lee Law Rev., vol. 24:314-319, 1967. 30 refs.*

Monetary compensation for damage from air pollution is recoverable under the nebulous tort concept of private nuisance, on the theory that a right in the use and enjoyment of land has been invaded. Within this category two distinct rules have been used by courts to determine whether the defendant is liable for damages: the Absolute Nuisance Rule and the Restatement of Torts Rule. The Absolute Nuisance Rule eliminates negligence as a requirement for imposing liability. The rule looks to the defendant s intention to bring about certain conditions which are in fact found to be a nuisance, without regard to whether his actions were reasonable or the invasion itself intended. The second approach, as set out in the Restatement of Torts, is an attempt to classify various forms of liability that constitute actionable nuisance. This view may leave a substantially damaged individual without remedy.

13288 APTIC NO. 30247

Broadhurst, V. A.

THE ASBESTOS REGULATIONS. *Steam Heating Eng. (London), 40(474): 6-9, May 1971. 4 refs.*

Today the health hazards of asbestos exposure are recognized as asbestosis, a specific fibrosis of the lungs; lung cancer as a complication of asbestosis; and mesothelioma, a cancer of the pleura (the lining of the lungs) or of the peritoneum (the lining of the abdominal cavity). These risks are covered by the Asbestos Regulations of 1969, which apply to every process involving asbestos or any article composed wholly or partly of asbestos. No process subject to the Regulations can be carried out unless equipment is used which prevents the entry of asbestos dust into the air of any workplace. The exhaust ventilation system is to be inspected at least once every seven days and thoroughly examined at least once every 14 months. Where asbestos dust is still likely to escape on occasion, protective respiratory equipment and protective clothing must be issued to employees. Other requirements pertain to the storage and distribution of asbestos, to the cleaning of plant equipment and premises by a suitable dustless method, and to restrictions on the employment of persons under 18 years of age.

13289 APTIC NO. 30431

Brugger, Benno

COMPETENCE FOR ENVIRONMENTAL PROTECTION. *(Zustaendigkeit fuer den Umweltschutz). Text in German. Umwelt (Duesseldorf), 1(2):13-14, 1971.*

The constitution does not give the federal government of West Germany direct power to pass laws concerning air pollution and noise pollution. Some right to regulate emissions and refuse disposal can be derived from the power to regulate traffic, the economy, and the food supply. The federal government feels, however, that this does not comply with the needs and introduced a constitutional amendment early in the summeof 1970. The amendment empowers the Federal government to initiate control legislation, a power that had so far rested with the individual states. Authority was transferred to the federal government in matters of air pollution, noise pollution, and waste disposal; water and wildlife protection remain a task of the states. Until this decision, the federal government could act in matters of industrial emission and automobile exhaust gas emission but not in the case of private polluters such as home oil heating systems.

13290 APTIC NO. 30886

Croke, Kevin G. and Jay E. Norco

AN EVALUATION OF ALTERNATIVE SOURCE SURVEILLANCE SYSTEMS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 34p., 1971. 1 ref. (Presented at the Air Pollution Control Association, Annual Meeting, 64th, Atlantic City, N. J., June 27-July 2, 1971, Paper 71-8.)*

The important design characteristics of an effective source surveillance system such as emission inventory, permit system, stack sampling, and data processing were analyzed. In the installation permit/emission inventory system, the basic difficulty in enforcing air pollution control regulations was assumed to be the proper design of an air pollution control system by a pollution source owner. This type of system focuses on new pollution sources and basically assumes that the rate of capital equipment turnover is large enough so that monitoring new devices and new pollution sources which will be installed would, in a short enough period of time, produce the desired enforcement of the new regulations. Under the second system, that of the inspection/emission inventory system, the design of air pollution control systems for new pollution sources was not as important; the major effort of the agency should be directed towards inspecting existing sources. The difficulty in obtaining accurate reporting of existing pollution sources would be the chief obstacle in enforcing the regulations. Consequently, most of the effort of a control agency in this system was directed towards inspecting existing sources to verify information received on a mail-out emission inventory form. By directing the major effort toward surveying existing sources, this type of system relies upon a low capital equipment turnover so that a surveillance of the existing pollution sources in a given year will give a fairly accurate picture of the emission rate and patterns. A very high turnover of capital equipment which is deemed pollution producing will lead to obsolescence of the inspection information. This type of system would probably produce a more rapid awareness by the existing pollution source owners of the necessity of complying with the new regulations.

13291 APTIC NO. 30879

Delogu, Orlando E.

LEGAL ASPECTS OF AIR POLLUTION CONTROL AND PROPOSED STATE LEGISLATION FOR SUCH CONTROL. *Wis. Law Rev., 1969(3):884-907. 28 refs.*

The basis of the legal doctrine of nuisance is that while an individual is to be accorded great freedom in the us of his property, he is nonetheless not permitted to use his property in a manner detrimental to the property interest of others. The underlying rationales of both public and private nuisance actions are very similar. Public actions, however, in addition to involving more people and larger affected areas, are also dependent on state or local enforcement personnel who may or may not be particularly competent in dealing with or keenly interested in pursuing problems of this nature. The same type of interferences with property rights which give rise to nuisance actions, give rise to and are the basis for the exercise of police power by a legislature. Air Pollution legilsation is discussed, including ordinances, standards, licensing, prohibitions, and other regulatory controls.

13292 APTIC NO. 30748

Dewees, Donald N. and J. Michael Hines

D. AUTOMOTIVE POLLUTION CONTROL. *In: Mass Transit and the Highway Trust Fund. Harvard Graduate School of Arts and Science, Cambridge, Mass., 1970, p. 38-42.*

NTIS: PB 195798

A hypothetical proposal is considered which would provide for Highway Trust Fund financing of federal efforts to reduce automobile air pollution. Because the cost of vehicular pollution, and thus of pollution control, is directly related to motoring, it seems equitable that user taxes finance this control effort.

13293 APTIC NO. 30283

Dodeweerd, J. J. van

THE DUTCH CLEAN AIR ACT. *(Enkele opmerkingen over de wet op de luchtverontreiniging). Text in Dutch. Ingenieur (The Hague), 83(10):A159-A162, March 12, 1971.*

Until the beginning of 1971, the responsibility for controlling air pollution in the Netherlands rested with municipal authorities under terms of the Public Nuisance Act. As air pollution is noticeable far beyond municipal borders, the Dutch Clean Air Act charges provincial administrations with the maintenance of clean air. The Act includes a system of licensing the industrial enterprises that cause serious air pollution. Special attention is paid those enterprises located in a region with more or less constant serious air pollution. Prescriptions can also be given for machines and fuels. In cases of emergency, the Act gives provincial authorities the right to interfere. The Inspection for Environmental Health and the Labor Inspectorate are designated as governmental advisors for local authorities.

13294 APTIC NO. 30695

Ellerbe, David R., David H. Scott, and David B. Smith

SURVEY OF LEGAL AND ADMINISTRATIVE AUTHORITY AFFECTING AIR, WATER AND SOLID

WASTE PLANNING. (PART ONE). David B. Smith Engineers, Inc., Gainesville, Fla., HUD Proj. FLA. P-56, 80p., April 1969. 7 refs.
NTIS: PB-184085

Regulatory authority data are compiled for local, state, and federal governmental agencies having jurisdiction with regard to comprehensive planning of water, sewage, and solid waste systems and air pollution control in Palm Beach County. Six or more federal agencies have major responsibilities in these areas, as do 10 state agencies, 23 regional agencies, three county agencies, and 15 municipalities reporting jurisdiction greater than normal through special ordinances. The authority of each agency is summarized, and analysis is made for compatability, overlaps, and hiatuses of responsibility. Matrices relate major programs to the various agencies involved. Pertinent ordinances, codes, policies, statutes, and special acts are briefed or excerpted. Funding agencies and authority are cited. (Author abstract modified)

13295 APTIC NO. 30866

Gruber, Charles W.

SOURCE INSPECTION, REGISTRATION, AND APPROVAL. *In: Air Pollution. Arthur C. Stern (ed.), Vol. 2, 2nd ed., New York, Academic Press, Chapt. 30, p. 561-595. 15 refs.*

Source inspection, registration, and approval are that part of the overall air pollution control effort which provides the contact with sources to motivate solution of air pollution problems. In addition to official control agency personnel, owners and managers also may sponsor inspections for their own guidance in reducing emissions and complying with regulations. Official source inspection is discussed, in terms of enforcement of visible emission regulations and in response to citizen complaints. Equipment needed for source inspection, training of the inspector, personnel orientation, rules of conduct, and forms and records are considered. Plant inspection by the owner s employees or a consultant is reviewed. The purpose of registering sources is to obtain an inventory of all equipment and operations which have the potential of emitting contaminants to the atmosphere. Once such an inventory has been obtained, the registration of new or additional sources through the permit system keeps this information current. Requiring approval of plans and specifications for new equipment will also provide good control to prevent adding any excessive source to the emission load.

13296 APTIC NO. 30764

Juergensmeyer, Julian Conrad

CONTROL OF AIR POLLUTION THROUGH THE ASSERTION OF PRIVATE RIGHTS. *Duke Law J., p. 1126-1155, 1967. 94 refs.*

Until governmental action is effective to keep the expulsion of air pollutants within tolerable limits, there are private rights which may under some circumstances be asserted by individuals to protect themselves from or obtain redress for injuries to their health and damage to their property. Assertions of private rights have control consequences in that they lead to injunctions against future pollution or in that damages obtained from polluters make the expulsion of pollutants expensive and thereby economically motivate polluters to control pollution. Three principal theories of action can be distinguished upon which the individual may ground this assertion of private rights: nuisance and trespass, which are generally used in connection with damage to property, and negligence, which is primarily used in connection with injury to person. A fourth theory--strict liability--is also discussed.

13297 APTIC NO. 30620

Kawamoto, Hirotaka

EXPLANATION OF AIR POLLUTION CONTROL ACT. *(Taiki osen boshiho no kaisetsu). Text in Japanese. Ryusan (J. Sulphuric Acid Assoc., Japan), 24(3):21-31, March 1971.*

The Air Pollution Control law passed by the 64th Extraordinary Diet session, aims at control of smoke, dust, exhaust gas, and special matter. Smoke is divided into sooty dust, sulfur oxides, harmful matter, and special harmful matter. Facilities which generate smoke are defined. Sooty dust generated by the incineration of fuel or by the use of electricity is the same as the traditional soot and other dusts; it includes soot, ash, metal, and other oxides generated by combustion. Use of electricity as a heat source implies the electric furnace process, for instance Harmful matter is defined as that generated by combustion, synthesis, decomposition, or other waste disposal methods (except mechanical process). Examples are cadmium, chlorine, fluoride, and lead. Special harmful matter is that generated, for example by combustion of nitrogen oxides. Facilities which generate harmful substances include electrolytic furnaces, reactors, crucibles and converters. Those who want to establish smoke-generating facilities must provide regional authorities with necessary information. Those who do not conform to the smoke standard are punished, ordered to alter their plan, or to abandon it. Mines are excluded from the definition of the facilities which generate smoke, as they come under the more strict Mine Safety Law. The smoke discharge standard is universal throughout Japan. The following smoke environmental standards apply: hourly values must be less than 0.2 ppm for 99% of the total hrs/yr; daily averages must be less than 0.05 ppm for over 70% of the total days/yr; hourly values must be less than 0.1 ppm for over 88% of the total hs/yr; the average annual hourly value cannot exceed 0.05 ppm. In any area, the number of days calling for emergency measures is not to exceed three percent of the total days/hr or to continue beyond three days. The standards are to be realized within 10 year in congested areas and within five years in already polluted areas.

13298 APTIC NO. 30792

Koolhaven, A. B.

LEGISLATION. *(De wetgeving). Text in Dutch. Polytech. Tijdshr. Ed. A, 26(10):369-372, June 5, 1971.*

In the Netherlands there has been little recent legislation relating to environmental problems, since it has been traditional to rely on interpretations of the Nuisance Act and to base administrative regulations on this foundation. Considerable study has been given recently, especially by the office of environmental hygiene, to the problem of framing new legislation that meets the demands of an environmental problem that is no longer of a local nature but has national and even international dimensions. Against this background, the problems of air, water, and soil pollution are discussed. In the field of air pollution, much more has been done of a concrete nature in obtaining new legislation from the Dutch Parliament. Industries are urged to adopt self-regulation before more stringent governmental regulations are found necessary, since in this way the various industries will preserve a higher degree of freedom, and will be in a position to select those means of prevention and control that are best suited to their individual economies.

13299 *APTIC NO. 30341*

Lensvelt, M. W.

AIR POLLUTION. (Luchtverontreiniging). Text in Dutch. Polytech. Tijdschr., Ed. Procestechniek (The Hague), 26(9):329-333, April 1971.

Air pollution disasters and attempts to set up warning systems0 t to avert such crises are evaluated. The London disaster of 1952 led to the Clean Air Act of 1956. The chronic smog epidemic on the west coast of the U. S. led to the establishment in 1959 and 1960 of a warning system based on measurements of sulfur dioxide. The program was a failure, but further evaluation led to the implication of photochemical smog as a major cause of pollution sickness. Some comparative figures are given on the danger level of various warning systems. The American west coast systems operated at 3 levels: the first at 2700-8000, the second at 15,500 and the third at 27,000 micrograms/cu m, based on one-hour readings. The German system, based on half-hour readings, sounds a warning at 750 micrograms, and the Rumanian system at 250. A factor of 0.89 is used to convert half-hour values to one-hour values. The 24-hour values for the U. S. are 600-720, while for Germany and Rumania they are 230-330 and 110 micrograms/cu m respectively. Dutch legislation and the studies on which it was based, existing equipment for pollution control, and the cost of implementing the control legislation are briefly summarized.

13300 APTIC NO. 30273

Middleton, John T.

RESCUING OUR ENVIRONMENT: THE FIRST PRIORITY. *Chem. Tech., p. 204-206, April 1971. (Presented at the Manufacturing Chemists Association, National Meeting, 1970.)*

In his environmental message to Congress last February, President Nixon set priorities for action and stated air pollution to be our most serious environmental problem. A new agency was established which brings under one organization the Federal programs dealing with air pollution, water pollution, solid wastes, pesticides, and radiation. The Environmental Protection Agency is responsible for establishing and enforcing standards, monitoring our environment, conducting research and demonstration projects, and assisting states and local governments. Programs which relate to the control of automobile emissions are mentioned. Another major proposal of the President was setting of national emission standards for major new stationary sources and for any stationary source emissions that are extremely hazardous to health. Electric generating plants and the issue of control of sulfur dioxide are discussed.

13301 APTIC NO. 30153

Morita, Minoru

REPORT ON THE BASIC RESEARCH CONCERNING THE ADMINISTRATION OF ENVIRONMENTAL POLLUTION AT HEALTH CENTERS. *(Hokensho ni okeru kogai gyosei ni kansuru kisoteki chosa kenkyu, hokokusho). Text in Japanese. Research Committee on the Administration of Environmental Pollution at Health Center (Japan). 189p., 1968.*

The actual condition of the administration of environmental pollution was studied with questionnaires. From January to December 1968, 832 nationwide health centers and organizations related to pollution problems in 46 prefectures and seven main cities were questioned, and 86.2% of the health centers, 93.5% of the organizations in 46 prefectures and 100% of those in seven cities replied. The number of the cases of complaints and petitions per year varied with cities and prefectures: there were 2648 cases in Osaka, which was the highest; 2613 cases in Tokyo; and 1116 cases in Hagoya. The content of the complaints and petitions received by the organizations differed from those received by health centers. Problems of air pollution and water pollution tend to be received by the former and bad odor and other pollution problems by the latter. The health centers found the pollutants, in most cases, through residents reports and 64.16% experienced the problems of pollution. The investigation of pollution varied with the anti-pollution measures used by each health center. However, Osaka and Kanagawa had the most cases per year (65), while Kyoto was second with 53 cases. At health centers in areas where soot and smoke is controlled, a considerable number of complaints and petitions mentioned not only air pollution, but also other pollution. In order to know more regarding the organized activities for anti-pollution measures, actual organizations and examples of investigations, in Mie Prefecture, Yokohama City, Kawasaki City, Tokyo, Shizuoka Prefecture, Sakai City, and Chiba Prefecture are listed.

13302 APTIC NO. 30825

Pluta, Thomas A. and John J. Tozzi

DEVELOPMENT OF LOCAL AIR POLLUTION CONTROL PROGRAMS IN NEW JERSEY. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa. 14p., 1971. 3 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 64th, Atlantic City, N. J., June 27-July 2, 1971, Paper 71-46.)*

The history of air pollution control in New Jersey is reviewed, emphasizing the development of a State policy and guidelines related to the role of local control programs. The legal financial and administrative requirements nd procedures on the Federal and State level are described. The progress of local program efforts in New Jersey is also presented. Local air pollution control agencies organized and operated in accordance with appropriate guidelines can provide meaningful assistance in supplementing the State s control program. (Author abstract modified)

13303 APTIC NO. 30397

Rabeneick, Pritz

PROTECTION OF THE ENVIRONMENT, AN INDIVIDUAL AND SOCIAL TASK. *(Der Umweltschutz, eine individuelle und gesellschaftspolitische Aufgabe). Text in German. Zbl. Arbeitsmed., 21(6):180-184, June 1971. 4 refs.*

The Federal Ministry of the Interior in the Federal Republic of Germany revealed that an extensive program for the protection of the environment is in preparation. It will primarily pertain to air pollution. The notion underlying the draft for the new laws is that of making those who are the source of the emission pay for emission control. Such a move, however, would actually make the consumer pay for the air pollution measures, the manufacturer would raise the price of his products to help pay the costs of pollution control. It would eventually lead to inflation. Those emissions which can be reduced by measures with low costs have been nearly eliminated already; those that still exist require enormous efforts for which public funds should be granted.

13304 *APTIC NO. 30139*

Schreiber, Michael

INFLUENCE OF SOCIAL COSTS. THE COSTS OF COMBATING AIR POLLUTION AND SITE SELECTION. (Einfluss der social costs. Luftreinhaltekosten und Standortwahl). Text in German. Wasser Luft Betrieb, 15(5):179-182, 1971. 11 refs.

Air pollution increases with increasing population density. The costs for combating air pollution rise with the collection efficiency. The profits of industrial enterprises are reduced through the costs for fighting air pollution. The amount of allowable emissions varies from region to region and depends on geophysical facts. The industries tend to concentrate because of technical, economic, and organizational advantages. Such industrial concentrations, however, may become a burden because of the greater amount of air pollution. The size of such industrial centers depends on the local weather conditions and on the altitude. If the site of the industrial center is on a plateau blown by gusty winds, then the maximum allowable emission concentrations are not as easily reached as at a site in a valley with relative calm. If an area is not close to the maximum allowable emission concentrations, the control measures taken to reduce the emissions will be less extensive than if the site is approaching the maximum allowable emission concentration.

13305 APTIC NO. 30864

Schueneman, Jean J.

AIR POLLUTION CONTROL ADMINISTRATION. *In: Air Pollution. Arthur C. Stern (ed.), Vol. 3, 2nd ed., New York, Academic Press, 1968, Chapt. 52, p. 719-796. 87 refs.*

The basic objective of air pollution control programs is to preserve the health and welfare of man, both now and in the distant future. Other objectives are protection of plant and animal life, prevention of damage to physical property and interference with its normal use and enjoyment; provision of visibility required for safe air and ground transportation, ensuring continued economic growth and development, and maintenance of an esthetically acceptable and, hopefully, enjoyable environment. Public policy in air pollution control and the air resource management concept are discussed. Local government programs, state government programs, funds available to state and local programs, interstate programs, and federal air pollution programs are considered. State-local relationships in regulatory control of air pollution are noted as well as interjurisdictional relationships. Emission inventories, air quality measurements, monitoring air pollution effects, public complaints, public interest, visible plume abatement, routine periodic inspection, and stack sampling are discussed. Air quality objectives or standards, emission control regulations, the enforcement process, variances, hearings, and appeals, control of new installations, sealing equipment, fireman training, disaster prevention, motor vehicle emission control, and fuel regulation are mentioned. Operation of the control agency is reviewed, including public relationships, control boards and commissions, data storage and retrieval, and fee systems. Community planning is discussed.

13306 APTIC NO. 30149

Shigeta, Yoshihiro

RESEARCH ON ODOR ABATEMENT AND CONTROL IN U.S.A. (II). *(Amerika ni okeru akushu no kisei to taisaku II). Text in Japanese. Akushu no Kenkyu (Odor Research J. Japan), 1(4):9-20, March 1971. 12 refs.*

Odor measurement in Seattle with a scentometer, actual conditions of obnoxious odor in the Columbia-Willamette Valley, Portland and its control regulations, and the control regulations of Chicago, Cleveland, and St. Louis were described. The kraft paper mill in the Puget Sound produces 325 tons/day of kraft paper with 9 digesters. The odor is a problem in the residential area about 6 km to the east of the kraft pulp mill, and its white smoke can be seen 30 km away. An electric dust collector was installed the recovery boiler was modified in 1968. By 1975, 98% of dust and more than 99% of odor will be eliminated. At present, the odor of the noncondensable gas is drawn out by fans and is burned by atomizing the oil burner at over 1000 F. The rest of the odor is eliminated by the Los Angeles formula. The Puget Sound Air Pollution Control Agency carries out wide range of air pollution control activities. A scentometer and the iodimetry method are being used for odor control. The Columbia-Willamette Air Pollution Authority consists of 5 counties and has 8 air pollution monitoring networks. One-third of the complaints it receives from the citizens were on obnoxious odors, but very few enterprises actually violate the pollution control regulations. Portland, as well as Los Angeles, is one of the few areas which made the installation of deodorizing devices compulsory. Chicago makes it a violation of the Air Pollution Control Law to emit soot, fly ash, dust, and embers within 1.6 km of the city. Cleveland's Air Pollution Control Law forbids the emission of harmful, poisonous, irritating odors, fumes or other pollutants from chimneys. In St. Louis, no one should emit obnoxious odors which are unpleasant to the people. In the industrial area or its neighboring areas, no odor of more than 20 Odir units is to be emitted, as measured with an olfactometer. When more than 30% of the residents in a residential area suffer unpleasant odors, such an odor is regarded as environmental pollution. No rendering factory can be operated without deodorizing in an approved manner.

13307 APTIC NO. 30890

Shiosawa, Kiyoshige

AIR POLLUTION CONTROL IN THE WORLD AND THE POSITION OF JAPAN. *(Sekai no taiki osen boshi no genkyo to wagakuni no tachiba). Text in Japanese. Karyoku Hatsuden (Thermoelectric Power Generation), 20(9):1-7, Sept. 1969. 2 refs.*

Observations on a tour of various western nations air pollution control methods and policies are discussed. Large scale anti pollution measures have been taken in the United States on both federal and local levels. Much money is spent for research and development of techniques (incineration, disposal, measurement, desulfurization) and basic studies of medical, biological, chemical, and meteorological effects of pollutants on the human body, plants, and animals. The British government is very active in dust and gas control. The 1956 Clean Air Act which is extremely strict and the 19th century Alkali etc. Works Regulation Act against toxic gases which is applied to 70% of the total industry are both noteworthy. West Germany has a relatively lenient and flexible air pollution control policy, but all measuring apparatus are installed by the federal government and a comprehensive investigation of the air of the entire nation is carried out. Compared to the cities of these Western nations, Japanese industrial cities are extremely polluted, possibly due to poor city planning; a slow start in preventive measures; and a lack of awareness on the part of citizens concerning environmental hygiene and public ethics. Disposal of pollutants is often administered by human labor in Japanese industry instead of automation as in the case of the U. S. which enables adhering to regulations.

13308 APTIC NO. 30693

Sueishi, Tomitaro, Masakatsu Hiraoka, Hisashi Sumitomo, and Kiyoshi Yamada

ENVIRONMENTAL PRESERVATION OF 21ST CENTURY. *(21 seiki no kankyo hozen keikaku). Text in Japanese. PPM (Japan), 2(5):2-11, May 1971.*

The future urban environment must be planned with a longer and broader view, with the development of a self-recycling system of natural resources. A combination of disposal and recycling systems will process urban and industrial wastes and separate them into three groups: (1) recycling, (2) reclamation (including reclamation from the sea and use of waste in building foundations for roads, parks, and airports), and (3) dumping in the ocean. Of the three, (2) will apparently solve both problems of limited land space and exhaustion of natural resources. Disposal in the ocean, the easiest and least costly, should be practiced only with an intermediary process of changing the material into a new nourishment source for the ocean. With the difficulty of accurate estimation of pollution damage in the 21st century, the budget for the anti pollution measures is still a question. However, if 10% per item waste is estimated in production, at least 10% of the industrial capital should be invested for the treatment of the waste. Future pollution must be treated as part of the natural human problem instead of keeping it away from human contact.

13309 APTIC NO. 30294

Takamatsu, Takeichiro

PREVENTION OF POLLUTION BY ENVIRONMENTAL CONTROL. *(Kankyo seigyo niyoru osen boshi taisaku). Text in Japanese. Nippon Kikai Gakkai-Shi (J. Japan Soc. Mech. Engr. (Tokyo), 74(626):213-214, March 1971.*

Human activity has both positive and negative effects. In the past, the negative effect was offset by the large capacity of the natural environment. Now that this capacity is saturated, the environment is contaminated. A practical synthesis of environment- controlling systems is required. The development of the computer extends the possibility of synthesis such as system engineering and control technology. These synthetic methods, which have been applied to the positive effect, should be applied to the problems of the negative effect. Optimal synthesis of the universe (system and environment) is our object now. The planning of a system considered to be useful must be controlled taking account its negative effect on the environment. As the natural concept, feedback control can be applied to the problem. For example, the monitoring system is the typical detector for the purpose. However, the time lag of the control system interrupts the effective control. The concept of feedforward control should be applied to this problem. Establishment of a model of the environmental system is important to express the quantitative mechanism of environmental pollution. The determination of the optimal condition for human life is very difficult. The first process of this problem is to realize circumstances within each standard. The important point of the system is that the subsystems included change with time; a dynamic system concept is required. The existence of uncertainty because of several parameters and factors such as wind speed or direction and temperature is the other feature of this system.

SOCIAL ASPECTS

13310 APTIC NO. 30175

Yokohama Isogo Ku Medical Assoc., Japan

COMMUNITY OPINION SURVEY ON REGIONAL ENVIRONMENT IN ISOGO WARD, YOKOHAMA CITY, 1968. *(Yokohama-shi Isogo-ku okeru chiiki kankyo ni tsuiteno ishiki chosa, Showa 43 nendo). Text in Japanese. 72p. 1969 (?). 3 refs.*

In September and October of 1968, a community opinion survey on the regional environment in Isogo Ward of Yokohama City was conducted. The survey was carried out by means of inquiry; 2445 inhabitants were randomly selected from a permanent poll book. The rate of answer was 94.0%. Items in questionnaires were made by referring to questions from the opinion survey which was conducted in 1959 and 1962 in Buffalo, New York, U.S.A. They were drawn up to examine the inhabitants evaluation, cognitional attitude, behavior, and opinions regarding regional environmental conditions, especially air pollution. The density of sulfur dioxide and the quantity of atmospheric dustfall in this ward were 0.82 mg/day/100 sq m (PbO2) and 7.7t/sq km/month in yearly average, respectively. In the inhabitants evaluation of their regional environmental conditions, 14.3% answered that they did not think their present living place was good because of noise and air pollution. Air pollution ranked tenth among their concerns about social problems. As for their evaluation of air pollution, 40.8% answered that the air was clean, and the percentage was 2 times of that of answers that the air was polluted 36.2% answered that the air was in its usual condition. These answers suggest that the inhabitants do not believe the air to be polluted. An offensive odor and irritating effects on the throat were experienced by 38.7%. By dividing the ward into four districts and comparing the results of the survey, it was found that there was a parallel relation in each district between their living environment and the standard of the atmospheric condition.

13311 APTIC NO. 30690

Harashima, Susumu, Tadao Miyasaka, Takeo Suzuki, and Jui Hishinuma

A REPORT CONCERNING THE COMMUNITY OPINION SURVEY ON ENVIRONMENTAL POLLUTION, 1967. *(Kogai ni kansuru ishikichosa hokokusho, Showa 42 nendo-). Text in Japanese. Keio Univ., Tokyo (Japan), Tokyo Univ. (Japan), Faculty of Medicine, Public Health, Tokyo (Japan), Dept of Industrial Health, and Daihyaku Mutual Life Insurance Co., Tokyo (Japan), 75p., April 1968.*

To assess community opinion on atmospheric pollution, a fact-finding investigation was made in Japan. The concentration of sulfur oxides and the amount of dust fall were used as an index to establish a relationship with the inhabitants opinion. The investigated area was selected at random from the sample area of the Health Census. The sample area was divided into four grades, according to whether they were urban or rural and to the degree of pollution. Especially polluted areas, including Shinjuku-ku, metropolitan district of Tokyo, and Yokkaichi, Mie Prefecture, were also studied. Those persons over 20 years of age, from the 22,836 households and 49,210 householders within the chosen investigated areas were questioned. The investigatory method was based on three factors; household votes, personal votes, and regional votes. Concern about public hazards, atmospheric pollution, noise, and vibration was low. Nationally, 48.6% thought themselves victims of hazards in some way or other, of which 38.1% thought that this was from public hazards. Nationally, 20.3% complained of symptoms attributable to air pollution, of which tiredness of the eyes, mental irritation, and headaches were prominent. Nationally, 30.4% of the households suffered damage, of which many listed soiling of wash, and soiling of house and interior rooms. Throughout the investigation, the higher the level of pollution the greater were the number of complaints and opinions on the issue. The special areas had very high readings.

13312 APTIC NO. 30871

Kasper, Raphael G.

SOME COMMENTS ON TECHNOLOGY ASSESSMENT AND THE ENVIRONMENT. *George Wahington Univ., Washington, D. C., Program of Policy Studies in Science and Technology, NSF Grant GI-41, NASA Grant NGL 09-010-030, GWPS-OP 8, 16p., Nov. 1970. 5 refs. (Presented at the George Washington University Panel Discussion, What to Do About the Environment, Washington, D. C., Nov. 19, 1970.)*

NTIS: PB 196640

The relationship between technology assessment and environmental problems was discussed. The effects of technology are concerned not only with the natural environment, but also with the much broader question of social benefits and costs. The three major difficulties are the tendency to take a narrow, technological view of what are often broad social problems, the tendency to conceive of the environment as a static entity, and the existence of numerous roadblocks to the effective acceptance and implementation of the results of technology assessments. (Author abstract modified)

13313 APTIC NO. 30624

Kiyoura, Raisaku

INDUSTRIAL DEVELOPMENT AND ENVIRONMENTAL PROBLEMS. *Chem. Economy Eng. Rev., 3(6):16-23, 28, June 1971.*

Japanese industrial development and the resulting environmental problems caused by pollution are discussed. The gross national product of Japan is compared with that of other nations and the suggestion that the GNP be reduced to improve the environment is considered. Arguments are presented to negate the criticism that Japan neglects antipollution measures in favor of industrial growth. Japanese sulfur dioxide emissions are compared with those of other nations and are lower than those of the United States, the Soviet Union, the United Kingdom, and Canada. Japanese industrial cities are claimed to be cleaner than those in the United States, the United Kingdom, and Germany. Japan has desulfurization plants for fuel oil and gas oil in operation at 16 establishments. No flue gas desulfurization technique has been perfected for commercial use. Another indication of Japanese efforts to reduce SO2 and dust emissions is the substitution of liquefied natural gas for heavy fuel oil. The economic impact of these antipollution measures is also discussed.

13314 APTIC NO. 30452

Mage, John A.

PUBLIC INFORMATION AND EDUCATION. *In: Air Pollution. Arthur C. Stern (ed.), Vol. 3, 2nd ed., New York, Academic Press, 1968, Chapt. 53, p. 797-811. 10 refs.*

Community-wide air pollution is a problem in which public information and education are of particular importance because of the widespread adverse effects that air pollution has on the community, the differences of opinion that often exist on its causes and solution, and the need for acceptance of control programs by individuals being regulated as well as those adversely affected. Just as the nature of the air pollution problem varies from community to community, so do the needs for and purposes of public information and education vary, depending on the actions desired of the public. Methods of public information and education are discussed, including a mass media approach and organizations in the community.

13315 APTIC NO. 30896

Miyoshi, H., A. Fukuda, and T. Mizuki

EPIDEMIOLOGICAL CASE STUDY ON COMPLAINTS OF ODOR. *(Akushu kujo jirei no ekigakuteki kenkyu). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):143, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, Tokyo, Japan, 1970.)*

Questionnaires were sent out to the citizens of Tokuyama City, Yamaguchi Prefecture, in July 1967 and November 1969 as a result of an average of 150 complaints a year against the odor created by the city s petroleum chemical industrial complex. Investigations by monitors and reports on complaints were studied in detail. A total of 42 complaints were reported in January to June in 1969; 112, from July to December 1969; and 63, from January to June in 1970. In each case, time, geographical conditions, descriptions of odor and physical effects, wind velocity, and the emission sources were investigated. Studies were sent to the management of the industry. Requests were made to avoid repetitious offenses, maintenance of repairs, and prevention of gas leakage, and for a better understanding and recognition of air pollution among the factory workers. The city of Tokuyama is offering the results of these investigations as basic data for industrial complex administration and for gas analyses in the future.

13316 APTIC NO. 30171

Shibata, Tokue

THE PROBLEM OF PUBLIC HAZARDS IN FOREIGN COUNTRIES - AMERICA S ATMOSPHERIC POLLUTION AND WATER CONSERVATION ARE TAKEN AS AN EXAMPLE. *(Shogaikoku no kogaimondai - America no taikiosen to suishitsu hozen o rei to shite). Text in Japanese. Inst. of Statistical Research, Tokyo (Japan), 20p., 1967 (?). 8 refs.*

America s air and water pollution was examined for the following: an assessment of and the attitudes toward loss from public hazards; the construction of control facilities and the methods of meeting the financial burden; and the methods and measures that can be taken against public hazards. The economic loss from atmospheric pollution in America for 1965 was $11 billion in terms of the repair of stone buildings, soiling of washing, and the decrease of agricultural production; the loss per person was estimated at $65. The cost for water pollution control, that is the finances for drainage, are shown divided between the financial burden of construction costs and the running costs. The construction expenses are difficult to obtain, since they come from general funds, the payment by the beneficiaries, and the income from use. Main trends in pollution control are research investigations, the technological development of preventives, government expenditure, the politcal attitude to establish the responsibilities of those making the public hazards, and the organization of citizen power. Citizen organizatons, public relations activities, and heavier penalties are necessary to achieve these trends.

13317 APTIC NO. 30761

Toebes, Gerrit H.

RESOURCE SYSTEMS MODELS IN DECISION MAKING. *Purdue Univ., Lafayette, Ind., Water Resources Research Center, Proc. Nat. Resource Systems Models Decision Making Seminar, Lafayette, Ind., 1969, p. 1-44.*

NTIS: PB 197111

Resource systems models and their evolution are introduced to provide a background. A liberal use of graphics is made to illustrate the various generic terms in common use. The operational role of systems analysis in ecological, administrative, and political concerns with water resources use is noted and diagrammed. Basic systems concepts and systems morphology are defined and illustrated by figures. Systems synthesis and systems optimization are seen as rather separate activities. A hierarchy of systems is defined and taken as a starting point for model synthesis and decomposition of systems models into functions. A brief introduction to systems analysis techniques is followed by a short discussion of systems evaluation. Finally, the question is considered as to what is the significance of the systems approach to actual decision making in natural resource development and management. (Author abstract modified)

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